



THE ANNALS  
AND  
MAGAZINE OF NATURAL HISTORY.  
[EIGHTH SERIES.]

No. 113. MAY 1917.

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XXXIII.—*Descriptions of New Pyralidæ of the Subfamilies*  
*Hydrocampinæ, Scoparianæ, &c.* By Sir GEORGE F.  
HAMPSON, Bart., F.Z.S., &c.

The numbers attached to the species in the following paper refer to the classification of Hydrocampinæ and Scoparianæ in the Trans. Ent. Soc. 1897, pp. 127-210, and to subsequent supplementary papers in the Ann. & Mag. Nat. Hist.

*ERIPASCHIANÆ.*

Genus *PLUTOPASCHIA*, nov.

Type, *Sericoa sicopsis*, Roths.

Prothorax fully developed; palpi upturned, the 2nd joint reaching to vertex of head, the 3rd rather long. Antennæ of female minutely ciliated; tibiæ smoothly scaled. Fore wing narrow, the apex rounded, the termen evenly curved; vein 3 from before angle of cell; 4, 5 stalked; 6 from upper angle; 7, 8, 9, 10 coincident; 11 from cell. Hind wing with veins 3 and 5 shortly stalked, 4 absent; 6, 7 from upper angle of cell, 7 anastomosing with 8.

Genus *GEROPASCHIA*, n. n.

*Geropaschia*, Hampson, A. M. N. H. (8) xviii. p. 134 (1916), nec Hampson, 1896.

Type, *G. griscealis*.

Ann. & Mag. N. Hist. Ser. 8. Vol. xix.

## CHRYSAUGINÆ.

*Murgisca mesozonalis*, sp. n.

♀. Head, thorax, and abdomen whitish; patagia and abdomen above tinged with rufous. Fore wing pale greenish yellow; a silvery-white fascia on base of innerarea bounded above by a rufous line; a medial silvery-white band from upper angle of cell to inner margin bounded by rufous and constricted at lower angle of cell and vein 1. Hind wing ochreous yellow; cilia of both wings silvery white.

*Hab.* W. AUSTRALIA, Sherlock R. (*Clements*), 2 ♀ type, Bozbourne. *Exp.* 22 mm.

## PYRALINÆ.

*Pyralis costinotalis*. Hampn. A. M. N. H. (8) xix, p. 67 (1917).

*Hab.* FORMOSA, Arizan (*Wileman*), 2 ♂ type. *Exp.* 24 mm.

## HYDROCAMPINÆ.

(1a) *Gargela aiphastola*, sp. n.

♀. Head, thorax, and abdomen silvery white, the last dorsally suffused with red-brown except on two basal segments; palpi with the 2nd joint golden brown behind; fore femora and tibiae suffused with golden brown, the tarsi ringed with brown towards extremity; ventral surface of abdomen tinged with golden yellow. Fore wing silvery white; a faint curved brownish postmedial line; a blackish point on termen below apex. Hind wing uniform silvery white. Underside silvery white; the fore wing with a black point on termen below apex.

*Hab.* D'ENTRECASTEAUX Is., Fergusson I. (*Meek*), 1 ♀ type. *Exp.* 18 mm.

(6) *Gargela obliquicilla*, sp. n.

Mid tibia of male dilated with a fold and tuft of long hair and fringed with hair above.

Head, thorax, and abdomen silvery white; antennæ brown except above; palpi behind, except the 3rd joint, and base of maxillary palpi dark brown; fore legs tinged with ochreous, the femora at extremities, tibiae near extremities and tarsi banded with black-brown. Fore wing silvery white; a golden-orange medial line, oblique to upper angle of cell, then inwardly oblique and faint; a golden-yellow tinge from end of cell to medial part of termen; an oblique golden-orange line from costa well beyond middle, where it is dilated into a small wedge-shaped mark to discal fold near termen, an oblique golden-orange wedge-shaped mark beyond it from costa to discal fold just before termen; a cupreous-brown terminal line from apex to discal fold, and a double cupreous-brown striga before termen.

above vein 3; cilia white, metallic golden at tips, with cupreous-brown line at base from vein 1 to submedian fold, and wholly tinged with gold towards tornus. Hind wing uniform silvery white.

*Hab.* Moluccas, Batchian (*Doherty*), 1 ♂, 1 ♀ type. *Exp.* 16 mm.

(5b) *Argyroctis leucostola*, sp. n.

Fore wing of male with small fovea below the costa beyond middle and vein 11 distorted.

Head, thorax, and abdomen silvery white; fore tibiae black at base and extremity. Fore wing silvery white, the costa suffused with blackish brown to end of cell; a reddish-brown spot in end of cell and oblique black-brown line from median nervure near end of cell to inner margin, diffused on inner side; a brown discoidal spot and oblique line from it to inner margin; postmedial line double, black-brown filled in with yellow and oblique to vein 3, then single, retracted with an upwards curve to lower angle of cell, then strongly excurved to inner margin, its sinus filled in with yellow; a terminal yellow band, arising just below apex, its inner side defined by a black-brown line to above vein 2 and its outer by black points, a silvery spot defined by brown before tornus below vein 2. Hind wing silvery white; a sinuous black-brown line from middle of costa to tornus, with a yellow patch before it below the cell; a double slightly sinuous black-brown line from costa just before apex to submedian fold, excurved below costa and filled in with yellow below vein 3; a yellow terminal band from apex to submedian fold, defined on inner side by a wavy black line except at apex; cilia with a brown line at base to vein 2.

*Hab.* BR. C. AFRICA, Mt. Mlanje (*Yeace*). 2 ♂, 5 ♀ type. *Exp.* ♂ 18, ♀ 22 mm.

(13a) *Argyroctis flavicittalis*, sp. n.

♂. Head, thorax, and abdomen whitish mixed with some red-brown; antennae red-brown; fore tarsi with brown bands towards extremities. Fore wing silvery white, the costal area suffused with brown; a brown antemedial line defined on outer side by white, incurved from below costa; a medial brown line defined on outer side by white, incurved below the cell; a small brown discoidal spot; postmedial line silvery white, defined on inner side by brown from costa to vein 4, then angled inwards to median nervure before end of cell, then oblique and defined on inner side by brown to tornus, with a wedge-shaped yellow patch above it from lower angle of cell to below its angle at vein 4; a silvery-white subterminal line defined on each side by brown from costa to vein 2 and a small brown spot with silvery-white mark before it below vein 2; cilia brown at base, whitish at tips. Hind wing white, the end of cell and the area beyond it from costa to vein 3 yellow; a silvery discoidal bar defined on inner side by a brown striga; postmedial line silvery white and oblique from costa to vein 3; a terminal black patch from below

apex to vein 2, with four ocelli on it with black centres defined on inner side by white and on outer by golden yellow; cilia white with brown line near base from apex to vein 2.

*Hab.* PERU, San Domingo (*Ockenden*), 1 ♂ type. *Exp.* 11 mm.

(20a) *Argyraetis cuprescens*, sp. n.

♀. Head, thorax, and abdomen cupreous red-brown mixed with some white, the abdomen banded with white; frons white at sides. Fore wing cupreous red-brown; a broad oblique silvery-white band from median nervure before middle to inner margin near base; a white medial line defined on each side by darker brown, excurved below costa, then erect; an orange-yellow discoidal bar defined on outer side by a brown line; postmedial line represented by a silvery-white bar from costa connected with an oblique wedge-shaped patch from beyond the cell to above vein 2 and an oblique band from lower angle of cell to inner margin with an orange-yellow patch between it and the wedge-shaped patch; a silvery-white band before termen ending in a point at vein 2; an orange-yellow terminal band defined at sides by brown lines, ending below submedian fold where it is bent inwards; cilia brown at base, white at tips. Hind wing silvery white; some brown at base; a brown medial band, incurved below the cell, with an orange-yellow discoidal patch on it and some orange-yellow below the cell; postmedial line cupreous brown, oblique to beyond lower angle of cell, then incurved; an irregularly reniform white subterminal patch defined by cupreous brown from costa to vein 4; a black terminal band from apex to vein 2 with five iridescent silvery annuli on it, defined on inner side by a white line with a wavy black-brown line before it and with some fulvous yellow from it to termen; cilia white, red-brown at base except towards termen.

*Hab.* ECUADOR, Rio Verde (*Palmer*), 1 ♀ type. *Exp.* 18 mm.

(21a) *Argyraetis productalis*, sp. n.

♀. Head, thorax, and abdomen red-brown mixed with whitish, the abdomen with whitish bands on basal and 3rd segments; antennæ red-brown; frons whitish; ventral surface of abdomen white. Fore wing red-brown mixed with white, the subterminal triangular patch from costa to vein 2 deep red-brown; a rather diffused white antemedial band from below costa to inner margin; a white medial band defined on outer side by brown, sharply bent inwards to inner margin; a white discoidal bar defined by red-brown; a white postmedial band, its outer edge oblique to vein 3, then retracted to near lower angle of cell, then oblique to inner margin near termen with its inner edge defined by brown; a silvery-white subterminal band from costa to below vein 2 where it ends in a point and is somewhat bent inwards, a fulvous-yellow band beyond it defined at sides by brown lines; cilia white, brown at base except towards termen. Hind wing white, the terminal area irrorated with black to vein 3;

a faint rather diffused yellow-brown medial line, oblique to below the cell, then incurved; postmedial line indistinct, yellow-brown, oblique to below vein 4, then inwardly oblique and sinuous; a black point just below apex and four black spots defined on outer side by silver before termen at veins 6 to 2 with a slight waved black line before them and some brownish beyond them before the blackish terminal line.

*Hab.* PERT, Carabaya, Oconeque (*Ockenden*), 1 ♀ type. *Exp.* 32 mm.

(24c) *Argyraetis argyrophora*, sp. n.

♀. Head and thorax silvery white, the vertex of head and dorsum of thorax with some rufous; abdomen silvery white irradiated with brown, the anal tuft rufous; palpi rufous, the extremity of 2nd joint and the 3rd joint white; pectus, legs, and ventral surface of abdomen white, the fore legs suffused with rufous and with black band at the extremity of the tibiae. Fore wing silvery white, the costal area suffused with rufous; a rufous antemedial line interrupted in submedian interspace; a silvery-white discoidal bar defined at sides by rufous; postmedial line rufous, oblique to vein 1, then almost obsolete and retracted to median nervure before end of cell, then strong and incurved, a silvery-white band beyond it extending to costa; a wedge-shaped rufous patch from costa to vein 1 before a white terminal band suffused with metallic silver defined by fine blackish lines and forming a wedge-shaped mark at toms, the area above this mark suffused with yellow; cilia white. Hind wing white; a fulvous-yellow discoidal bar defined on outer side by a metallic silvery bar; an oblique postmedial metallic silvery band, interrupted at vein 4 and ending on termen above toms, defined on inner side by a yellow band and with the area beyond it yellow; five partly confluent black spots on termen with some metallic silvery between them from below apex to vein 2 and with some silver on termen from them to toms; cilia white with a fine brown line near base from apex to vein 2.

*Hab.* COLOMBIA, Choko Prov., Condoto (*Spurrell*), 5 ♀ type, R. San Juan, Juntas de R. Tamana, 1 ♀. *Exp.* 20 mm.

(25a) *Argyraetis brunneosuffusa*, sp. n.

♀. Head and thorax red-brown mixed with some whitish; abdomen fulvous brown with whitish segmental lines, the base with some whitish; palpi with the 3rd joint white; ventral surface of abdomen red-brown with white segmental lines. Fore wing whitish suffused with red-brown especially on costal area; a sub-basal shade formed by black-brown scales; a curved whitish antemedial line defined by shades formed by dark brown scales in the interspaces; a slight white discoidal lunule defined by diffused dark brown; postmedial line white defined on inner side by rather diffused dark brown, oblique to vein 6, incurved at discal fold, at

vein 3 retracted to just below angle of cell and excurved below vein 2; a white subterminal band narrowing to points at apex and vein 2, defined on inner side by diffused dark brown and on outer by a yellow terminal band defined on each side by dark lines. Hind wing white, the inner area tinged with red-brown; an oblique white band beyond the cell from below costa to submedian fold, defined on each side by red-brown shades; postmedial line white, oblique to vein 2 where it is excurved to near termen, incurved at submedian fold then bent outwards to termen above tornus, defined on inner side by red-brown and with an oblique white bar before it; near tornus, the area beyond it suffused with brown from costa to vein 2 with a whitish patch on it; a black band just before termen from below apex to vein 2, with four metallic silvery annuli on it; the apex yellow followed by a yellow line beyond the ocellate band; cilia white with a brown line at base to vein 2.

*Hab.* ECUADOR, R. Pastaza, Banos (*Palmer*), 1 ♀ type. *Exp.* 32 mm.

(31b) *Argyrotaenia mimicalis*, sp. n.

Head and thorax whitish mixed with pale red-brown; abdomen white tinged with pale red-brown; pectus, legs, and ventral surface of abdomen white with a faint rufous tinge. Fore wing white irrorated with blackish; an inwardly oblique antemedial series of black striae; a yellow patch in and above end of cell; medial line black, erect to just beyond lower angle of cell, then oblique, sinuous and with another faint line before it towards inner margin; an indistinct black postmedial line from vein 3 to inner margin, angled outwards above vein 1; the apical area yellow, broadly at costa and narrowing to a point at submedian fold; a subterminal white spot below costa before a blackish and silvery line from below the costa to vein 3 towards which it is rather diffused; a small black spot at apex, then a terminal series of black points to submedian fold where there is a black and silvery mark before it; cilia white mixed with fuscous. Hind wing white thickly irrorated with black except on basal and terminal areas; a diffused oblique black subbasal band from discal fold to inner margin; a wavy white medial line slightly defined on each side by black; subterminal line white defined on each side by black, excurved below costa, then sinuous; terminal area yellow; a black bar with some silvery-blue scales on it at apex, then three black ocelli each with two silvery-blue points on them and a black spot with some silvery blue on it below submedian fold; cilia white with a black line near base to discal fold, then black bars beyond the ocelli.

*Hab.* SIERRA LEONE (*Clements*), 1 ♂; N. NIGERIA, Zangari (*Macfie*), 1 ♀ type, Borgu, Yelwa L. (*Migeod*), 1 ♀. *Exp.* 14 mm.

(31 c) *Argyraetis ugualis*, sp. n.

♂. Head and thorax pale yellow mixed with black-brown and some white; abdomen pale red-brown with white segmental lines and a blackish patch before extremity; antennæ dark brown ringed with white; palpi pale rufous; pectus and legs white tinged with rufous, the fore tibiae with black band near extremity; ventral surface of abdomen white. Fore wing white irrorated with black: a blackish patch at base of costa; a diffused inwardly oblique black subbasal line; a golden-yellow antemedial patch defined by black scales from cell to inner margin; a double inwardly oblique sinuous black medial line; postmedial line double, black filled in with white, oblique to vein 3, then retracted with an upwards curve to lower angle of cell, then strongly excurved above inner margin, the area beyond it yellow irrorated with black; a white subterminal band defined by black lines from costa to vein 4 with some black below it and an oblique black mark above tornus; a terminal yellow band to vein 2; cilia white mixed with black. Hind wing white, the postmedial area to vein 2 and the terminal area irrorated with black; a small black spot on inner margin near base; a broad black antemedial band from below costa to inner margin with a small yellow spot on it in lower angle of cell, defined on outer side by a white line followed by a curved black line; a double black subterminal line filled in with white, excurved below costa, then sinuous, the area beyond it yellow; four rather diffused black ocelli with silvery-blue points on them on termen between vein 7 and the submedian fold, with a waved black line before them; cilia blackish at base, white at tips.

Hab. BR. C. AFRICA, Blantyre (*Dacry*), 1 ♂ type. Exp. 16 mm.

(45 a) *Argyraetis melanographa*, sp. n.

♂. Silvery white; head with some black-brown behind; abdomen with black-brown band on 2nd segment and slight lar near extremity, the anal tuft brown at extremity; palpi with the 3rd joint black; fore femora and fore and mid tibiae black-brown in front, the tarsi banded with black-brown. Fore wing with oblique black-brown subbasal band from costa to median nervure; medial line black-brown, double and oblique towards costa, then single, inwardly oblique, rather diffused and bent inwards to inner margin; subterminal line black-brown, double towards costa and inner margin, bent outwards to costa where the inner line has a short streak on its inner side at costa, excurved to near termen at middle and with some black-brown suffusion beyond it at tornus; a black-brown terminal line from below apex to vein 4; cilia tinged with yellow. Hind wing with some black-brown in end of cell; an obliquely curved black-brown medial line, arising below costa and diffused on outer side towards inner margin; a rather interrupted sinuous black-brown subterminal line, diffused below discal fold; cilia



yellow at base and with some black-brown scales at middle at apex, brown at base from discal fold to tornus.

*Hab.* BR. GULANA, Demerara (*Rodway*), 1 ♂ type. *Exp.* 10 mm.

(46*a*) *Argyraetis phaeopastalis*, sp. n.

♀. Head and tegulae white; thorax and abdomen white suffused with brown; antennae brown, yellowish white towards base; palpi white; pectus, legs, and ventral surface of abdomen white, the fore and mid legs tinged with yellow. Fore wing red-brown; a slight whitish medial line, angled outwards below costa and excurved below the cell; an obliquely curved white postmedial line from costa to vein 4 where it is met by an oblique white mark on its inner side from vein 6; a silvery-white subterminal band from below costa, where it is bent outwards to vein 4, an orange-yellow band beyond it on termen extending to vein 2 and defined by brown lines, some silvery white below it above tornus; cilia white. Hind wing red-brown; an indistinct sinuous whitish medial line defined on inner side by darker brown; four minute ocelli just before termen between veins 7 and 2 with black centres and metallic silvery annuli; cilia white, yellow at base and with dark brown line at middle from apex to vein 2.

*Hab.* COLOMBIA, Choko, Prov. Condoto (*Spurrell*), 1 ♀ type. *Exp.* 10 mm.

(1*c*) *Eristena tenebrifera*, sp. n.

Antennae of male thickened with scales above towards base; hind femora with fringe of short hair behind towards base, the hind tibiae with large tuft of long hair on inner side; fore wing with veins 3, 4 stalked.

♂. Head, thorax, and abdomen white tinged with ochreous brown and mixed with some fuscous; antennae fuscous; hind legs with the fringe of hair on femora whitish, the tuft of hair on tibiae white at base, black at tips. Fore wing white tinged with ochreous brown; some black suffusion on basal area; medial area with some black suffusion, its inner edge rather oblique, its outer incurved below the cell and excurved above inner margin; some blackish suffusion on postmedial costal area and two rather diffused blackish subterminal lines, somewhat excurved below costa, then oblique; a slight dark terminal line with some ochreous brown before it. Hind wing white, the terminal area suffused with ochreous brown.

*Hab.* DUTCH N. GUINEA, Minika R. (*Wollaston*), 1 ♂ type. *Exp.* 14 mm.

(1*f*) *Eristena tetralitha*, sp. n.

♀. Head, thorax, and abdomen grey suffused with brown and some fuscous; pectus and ventral surface of abdomen whitish; fore tibiae with black stripe. Fore wing whitish suffused with

down and irrorated with black; an oblique diffused black ante-medial shade; the cell whiter towards extremity; postmedial line rather diffused, black, obliquely curved to vein 3, then bent upwards to upper angle of cell, then inwards and oblique to inner margin, the area above its sinus whitish except towards costa and the area in its sinus at end of cell and the whole area beyond it rufous; an obliquely curved rather maculate silvery subterminal line defined on each side by fuscous; a terminal series of black points; cilia white mixed with brown. Hind wing whitish; the basal area tinged with brown and suffused with black; a rather diffused curved black postmedial line, incurved below vein 3; the terminal area suffused with rufous; four small black ocelli before termen between discal and submedian folds, the two or three upper ocelli with white points in centre, and the upper one with a black point above it; cilia whitish tinged with brown and with a brown line near base.

*Hab.* Druce N. GUINEA, Mimika R. (*Wollaston*), 5 ♀ type, Wataikwa R. (*Wollaston*), 4 ♀, Snow Mts., Setakwa R. (*Meek*), 1 ♂; BR. N. GUINEA, Kumusi R. (*Meek*), 3 ♀. *Exp.* 14-20 mm.

(16a) • *Nymphula maullensis*, sp. n.

♂. Head, thorax, and abdomen yellow mixed with some white and fuscous, the last white at base and extremity and with black segmental lines; antennæ yellow ringed with black; pectus, legs, and ventral surface of abdomen white slightly irrorated with brown. Fore wing yellow irrorated with dark brown and mixed with some white, especially on outer half of medial area except towards costa; ante-medial line white defined by some black scales, oblique below the cell; a black point in middle of cell and some black suffusion lower of cell; medial line white defined on inner side by black scales, oblique to middle of discocellulars, then inwardly oblique, an oblique white mark beyond it below costa; postmedial line double, brown filled in with white, arising below the costa where there is a white mark before it, oblique and sinuous; subterminal line formed by somewhat dentate white marks defined on each side by blackish, incurved at middle. Hind wing yellow irrorated with black, the base white; an oblique black mark above inner margin near base; medial line double, black filled in with white, sinuous; medial area white with a yellow patch defined by black from below costa to vein 2; postmedial line double, black filled in with white, obliquely curved, slightly sinuous towards costa; a rather maculate white subterminal band defined on each side by black, sinuous; a fine black terminal line; cilia white.

*Hab.* PHILIPPINES, Manila (*Ledyard*), 1 ♂ type. *Exp.* 11 mm.

(19a) *Nymphula leucoplugalis*, sp. n.

*D. leucis zailualis*, Druce, Biol. Centr.-Am., Hct. ii. p. 568 (part.), nec Wlk.

♂. Head, thorax, and abdomen fulvous yellow mixed with fuscous

and some white; antennae black; pectus, hind legs, and ventral surface of abdomen towards base white; fore tibiae fuscous, white at extremities. Fore wing fulvous yellow irrorated with dark red-brown; a subbasal red-brown shade; a medial red-brown shade with some white scales on it in end of cell, a white patch beyond it on costal area, defined on outer side by a red-brown shade joining the medial shade at lower angle of cell, then with three small white spots on its outer edge, a small white spot beyond it on costa; the terminal area suffused with dark red-brown. Hind wing fulvous yellow, the basal half and terminal area suffused with dark red-brown.

*Hab.* MEXICO, Morelos, Cuernavaca (*H. H. Smith*), 1 ♂ type, Godman-Salvin Coll. *Exp.* 14 mm.

(30*b*) *Nymphula plumbeifusalis*, sp. n.

♀. Head and thorax leaden grey tinged with fuscous; abdomen white, basally suffused with reddish brown; antennae dark brown; frons white; palpi with the 3rd joint white; pectus, legs, and ventral surface of abdomen white, the fore and mid legs tinged with brown, the fore tibiae blackish on inner side, white on outer side except towards base. Fore wing leaden grey tinged with brown; an antemedial black spot below the cell and slight rufous and dark shade towards inner margin; a black discoidal spot; an indistinct diffused rufous postmedial shade, incurved below vein 4 to below end of cell, arising below the costa and interrupted below the cell; a faint dark subterminal shade; a faint punctiform brown line before termen and terminal series of slight dark spots. Hind wing pure white; a faint reddish-brown line from lower angle of cell to vein 1; a reddish-brown postmedial bar at discal fold, diffused spot at vein 2 and small spot at inner margin; a punctiform line before termen and a terminal line; cilia white mixed with reddish brown and chequered with darker brown at base.

*Hab.* SUDAN, Blue Nile (*Flower*), 6 ♀ type. *Exp.* 20 mm.

(52*b*) *Nymphula metastictalis*, sp. n.

♀. Head, thorax, and abdomen white, the metathorax with brownish bar, the abdomen tinged with ochreous brown except at base; fore tibiae fuscous brown at extremities. Fore wing silvery white slightly tinged with ochreous brown except on terminal area; small black-brown spots at base of costa and cell; a black-brown antemedial spot on costa; an inwardly oblique brown medial line with black spot at costa; a small white discoidal spot indistinctly defined by brown; postmedial line brown with a black spot at costa where it arises towards apex, excurved to vein 2, then incurved to inner margin below end of cell; a curved brown subterminal line from vein 7 to submedian fold; a fine black terminal line before a yellow terminal band, punctiform towards apex; cilia white suffused with brown. Hind wing white suffused with reddish brown except

at base and on inner area; diffused brown ante- and postmedial lines and a faint subterminal shade; two small black spots just before termen below apex and eight between discal and submedian cells, all defined on inner side by white; the termen yellow; cilia black at base, white at tips.

*Hab.* Goodenough L. (*Meek*), 1 ♀ type. *Exp.* 20 mm.

(53 b) *Nymphula flavicostalis*, sp. n.

♂. Fore wing of male without fovea below the cell.

Head and thorax white mixed with black-brown and some yellowish; abdomen white irrorated with black forming diffused dorsal bands except at base; antennæ yellow ringed with brown; palpi yellow mixed with red-brown; pectus and ventral surface of abdomen white irrorated with dark brown; legs white, the tibiae and tarsi banded with black. Fore wing white tinged in parts with brown and irrorated with black-brown, the costal area to end of cell and towards apex orange-yellow; antemedial line white defined on each side by blackish, curved, obsolete at inner margin; an elongate white spot in the cell before the medial line which is white defined on each side by blackish, slightly waved, oblique below the cell, a white patch beyond it on costal area; an irregular yellowish discoidal spot defined by black scales; postmedial line white defined on each side by dark brown, maculate and slightly curved to vein 3, then bent inwards and obsolescent to lower angle of cell, then erect and sinuous, some alternating black and white marks before it on costa; a white subapical point, then a series of white subterminal lunules, larger and extending to near the postmedial line above and below vein 6, with diffused black marks beyond them to vein 3; the termen narrowly yellow; cilia black at base, then white with black marks towards apex and at middle. Hind wing white; rather diffused brownish medial and postmedial lines; the termen suffused with brownish, its inner edge slightly waved; some slight dark marks on termen towards apex; cilia with some dark scales at tips; yellowish at base and with a blackish line at middle between veins 3 and 1.

*Hab.* PERU, Carabaya, Oconeque (*Ockenden*), 1 ♂ type. *Exp.* 22 mm.

(53 c) *Nymphula graphialis*, sp. n.

♀. Head, thorax, and abdomen white, the last with faint dorsal ochreous-brown bands except at base. Fore wing silvery white; a subbasal black point below vein 1; a slight antemedial spot formed by black scales below costa; medial line with an oblique black striga from costa, then double and pale ochreous brown, incurved in the cell and obliquely excurved below it; a narrow discoidal lunule defined by black and a patch of pale ochreous-brown suffusion below end of cell; postmedial line double, brown with a black point on the inner line at costa, excurved below costa, then oblique,

slightly waved and paler below vein 4, a pale ochreous-brown tinge before its costal half and beyond it below vein 5, pale ochreous-brown streaks beyond it on costa and vein 7 with a black streak between them from termen; cilia tinged with ochreous brown. Hind wing silvery white; a double waved black-brown antemedial line; a discoidal bar defined by black-brown; postmedial line double, ochreous brown and somewhat dentate, slight ochreous-brown suffusion before it except towards costa and inner margin and slight streaks beyond it on the veins of costal half, then brown suffusion to tornus; cilia with pale ochreous brown mixed.

*Hab.* PERTU, Carabaya, Oconeque (*Oekenden*). 1 ♀ type. *Exp.* 20 mm.

(1b) *Margarosticha gaudialis*, sp. n.

♂. Head and thorax greyish mixed with brown, the tegulae and patagia with some fulvous; abdomen fulvous with brown dorsal bands; antennae whitish tinged with brown; palpi banded with dark brown; pectus, legs, and ventral surface of abdomen whitish tinged with brown, the fore legs with the femora black above, the tibiae black at extremities, the tarsi with black marks at the joints. Fore wing fulvous orange, the base tinged with brown; an oblique silvery band defined on each side by brown from middle of cell to inner margin; the fovea in end of cell surrounded by brown suffusion; a triangular silvery-white mark beyond the cell defined by rather diffused brown which extends to the costa; a silvery-white subterminal band from costa to vein 4 where it ends in a point, defined on inner side by rather diffused brown and on outer by a black line extending to below vein 3; a terminal series of small black spots to vein 2 and a short leaden-brown fascia above tornus ending in a silvery point; cilia silvery. Hind wing fulvous orange, the base pale; a slightly sinuous silvery-white medial band defined on each side by brown; the postmedial area brown, ending in a point above tornus; four ocellate black spots on termen between vein 7 and submedian fold, defined on inner side by a waved white line and with fulvous orange between them, a small triangular black spot above the uppermost ocellus; cilia silvery.

*Hab.* ADMIRALTY Is. (*Meek*), 3 ♂ type. *Exp.* 18 mm.

(3a) *Margarosticha euprepialis*, sp. n.

♂. Head and thorax silvery white, the shoulders and some hairs at tips of patagia yellow-brown; abdomen silvery white at base with a yellow-brown band, then pale yellow with slight yellow-brown dorsal spots to beyond middle and silvery-white segmental lines; antennae pale fulvous; palpi white, the 2nd joint banded with pale red-brown; pectus, legs, and ventral surface of abdomen silvery white, the fore tibiae tinged with yellow above. Fore wing pale yellow; a red-brown tinge at base of costa and a triangular white patch on basal inner area defined on outer side by red-brown scales;

a broad oblique silvery-white medial band from cell to inner margin, defined on inner side by a curved red-brown line and on outer by a diffused red-brown patch from submedian fold to inner margin; an oblique silvery-white discoidal bar beyond the fovea; an oblique radial silvery-white postmedial patch from costa to vein 3, defined by red-brown and with some red-brown beyond it on costa; a silvery-white subterminal band from costa to discal fold, defined by red-brown extending to vein 2 where it ends in a point and with a wedge-shaped brown mark below it above tornus, these brown markings tinged with silvery below the band; a fine red-brown terminal line; cilia silvery. Hind wing white; a black-brown subbasal band from below costa to above outer margin; a yellow band from middle of costa to tornus defined on each side by slightly sinuous red-brown lines, the outer line with a brilliant silver line beyond it; the area beyond the band irrorated with black scales; five black ocellate spots on a white band on termen between discal and submedian folds with small brilliant silvery spots between them; the termen yellow towards tornus; cilia silvery.

*Hab.* QUEENSLAND, Townsville (*Dodd*), 1 ♂ type. *Exp.* 22 mm.

(5) *Margarosticha argyrograpta*, sp. n.

♀. Head, thorax, and abdomen orange-yellow with a golden gloss, the head, patagia, and base of abdomen with some white; palpi white with brown band at extremity of the 2nd joint and the 3rd joint yellow; pectus, legs, and ventral surface of abdomen white, the fore and mid tibiae tinged with yellow and the former black at extremity. Fore wing orange-yellow; a silvery-white subbasal patch from middle of cell to inner margin where it extends to the base, its outer edge angled outwards at median nervure; an oblique silvery-white medial band from discal fold to inner margin, produced to streaks beyond lower angle of cell and below cell 2; an oblique triangular silvery-white postmedial patch from costa to vein 4, its outer edge defined by brown; a wedge-shaped silvery-white subterminal band from costa to below vein 3, slightly defined at tips by brown and its lower part metallic silvery; a metallic silvery fascia above tornus; a terminal series of black points with larger point at apex; cilia white tinged with yellow. Hind wing orange-yellow, the base white; a silvery-white medial band with slightly wavy edges, its inner edge defined by brown; a metallic silvery postmedial lunule between veins 5 and 2 and a spot above tornus; three large black ocellate spots on termen between discal and submedian folds with some silvery scales on their inner edge and a line before them which is yellowish above and silvery white below, extending to termen below the lowest spot, a small triangular black spot above the uppermost spot on termen; cilia silvery white at base, white tinged with brown at tips.

*Hab.* BISMARCK ARCHIPELAGO, Rook I. (*Meek*), 3 ♀ type. *Exp.* 18-22 mm.

(1c) *Cataclysta perirrorata*, sp. n.

Head, thorax, and abdomen silvery white mixed with brown; antennæ white tinged with brown; palpi white tinged with yellow; pectus, legs, and ventral surface of abdomen white tinged with brown. Fore wing white, the medial area irrorated with large black scales; the base orange-yellow with some brown at costa; an inwardly oblique orange-yellow antemedial band slightly defined at sides by brown; an oblique orange-yellow postmedial band from below costa to termen at submedian fold where it is confluent with a similar curved subterminal band, a silvery point below its extremity with a yellow striga before it to tornus; an orange-yellow terminal band from just below apex to vein 3 where it ends in a point, defined on inner side by a brown line and with some silver between it and the subterminal band except towards costa; cilia white mixed with brown. Hind wing white, the medial area irrorated with large black scales, narrowing to inner margin near tornus; a faint oblique orange-yellow antemedial shade; two finely slightly waved black subterminal lines, slightly curved below costa and bent outwards to tornus; four ocellate black spots on termen from below apex to submedian fold with small metallic silver spots on the 1st and 4th and small silver spots between them on termen; cilia white with a brown line at base and some brown at tips especially towards apex.

Ab. 1. Abdomen orange-yellow mixed with brown; fore wing with the costal area suffused with brown, the medial area more thickly irrorated with black except towards costa, the medial band on outer side and the subterminal band on inner side with some silvery suffusion, the oblique postmedial band almost interrupted at middle and with distinct bar from it to tornus; hind wing suffused with brown except at base, the oblique orange-yellow antemedial band distinct, defined by brown and bent inwards to inner margin, the ocellate terminal black spots more confluent. Br. C. Africa. Mashonaland.

Ab. 2. Fore wing with the bands and hind wing with the antemedial shade rufous. Cape Colony.

Hab. GOLD COAST, Appan, 1 ♂, Bibianaha (*Spurrell*), 4 ♂, 2 ♀, Kumasi (*Sanders*), 1 ♂ type; S. NIGERIA, Ebute Meta (*Boag*), 1 ♂, 1 ♀; BR. C. AFRICA, Zomba (*Old*), 1 ♀, Mt. Manje (*Neave*), 1 ♂, 2 ♀; MASHONALAND (*Dobbie*), 2 ♂; CAPE COLONY, Amshlaw (*Miss F. Barrett*), 1 ♂. *Esp.* 12-16 mm.

(1e) *Cataclysta nigristriata*, sp. n.

Head, thorax, and abdomen silvery white suffused with red-brown, the last more fulvous towards extremity; palpi brown towards base, white towards extremity; pectus, legs, and ventral surface of abdomen white tinged with brown. Fore wing white, the medial area except towards costa irrorated with large black scales and with fine black streaks beyond the cell and on vein 1

and inner margin, the terminal area from costa beyond middle to inner margin near tornus golden yellow; the base reddish brown with inwardly oblique outer edge; a faint inwardly oblique yellowish antemedial band, followed by a cupreous-brown medial line, incurved below the cell; an oblique wedge-shaped white post-medial patch from costa to discal fold, defined on inner side by brown; a subterminal band from below costa to vein 4 where it ends in a point, white above, silvery below, defined by black lines, the line on inner side reaching the costa; an oblique silvery bar from below vein 4 beyond the cell to just above tornus; cilia white tinged with cupreous brown except at submedian fold and at tips between veins 6 and 4. Hind wing white, the medial area irrorated with large black scales and with slight streaks below costa and triangular in shape, from costa to submedian fold; cupreous-brown bars at and beyond end of cell; the inner area orange-yellow from before middle to tornus with metallic streaks on it at middle of inner margin and in terminal part of submedian fold; an oblique black line from below apex to submedian fold beyond middle; five ocellate black spots on termen from below apex to above tornus with a white band before them and orange-yellow between their upper parts and metallic silver spots on termen, the first and third black spots smaller; cilia cupreous brown, white at tips except at apex.

*Holb.*, DUTCH N. GUINEA, Ron L. (*Doherty*), 1 ♂, 1 ♀, Kapaur (*Doherty*), 1 ♂, Mimika (*Woodaston*), 1 ♂ type; ADMIRALTY IS. (*Holb.*), 1 ♂, 1 ♀; LOUISIADÉ IS., St. Aignan (*Mack*), 1 ♀. *Exp.* 12 mm.

(19) *Cataclysta amboinalis*, sp. n.

♀. Head, thorax, and abdomen golden yellow mixed with white and black; antennae brownish, yellow towards base; palpi yellow tinged with brown; pectus, legs, and ventral surface of abdomen white tinged with brown. Fore wing white, the basal area and costal area to end of cell tinged with cupreous brown, the medial area irrorated with large black scales except towards costa, the apical area from costa at end of cell to termen above tornus golden yellow defined on inner side by brown; antemedial line dark brown, slightly curved; an oblique wedge-shaped silvery-white postmedial patch defined by brown from costa to vein 4; a curved subterminal band from costa to vein 3, silvery white above, metallic silvery below defined by black lines, the outer line not reaching the costa; an oblique metallic silvery spot defined by blackish above tornus; cilia cupreous brown at base, white tinged with brown at tips, at submedian fold pure white to base. Hind wing white, the medial area irrorated with large black scales except towards inner margin, the terminal area cupreous brown; a slight black spot near base below the cell; an indistinctly double oblique cupreous-brown antemedial line; four partly confluent ocellate black spots with metallic silver centres on termen from below apex to submedian



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fold, with some orange-yellow scales before the three lower spots; and metallic gold points between the spots on termen; cilia cupreous brown at base, white tinged with brown at tips.

*Hab.* AMBOINA (*Doherty*), 1 ♀ type. *Exp.* 12 mm.

(1*h*) *Cataclysta queenslandica*, sp. n.

♂. Head and thorax silvery white, the patagia yellowish at tips; abdomen silvery white suffused with golden yellow; antennæ brownish with white points in front; palpi yellow tinged with brown; pectus, legs and ventral surface of abdomen white tinged with yellow, the fore femora above and tibiae on inner side black. Fore wing white, the basal area obliquely and the costal area to end of cell cupreous brown, the medial area irrorated with cupreous brown except towards costa, the terminal area orange-yellow from costa at end of cell to inner margin near tornus; a cupreous-brown discoidal spot and two lines from lower angle of cell, diverging towards inner margin; an oblique wedge-shaped silvery-white post-medial patch from costa to vein 4, some cupreous brown beyond it on costa; a subterminal band from below costa to vein 3, where it ends in a point, white above and metallic silver below, the white part defined at sides by cupreous brown on inner side extending to the costa; an oblique metallic silver spot above tornus; a fine dark terminal line; cilia cupreous brown, white at submedian fold. Hind wing white, the postmedial area irrorated with large black scales, triangularly from costa where it extends to apex to submedian fold; the base tinged with yellow; a cupreous-brown ante-medial bar in and below the cell; an oblique cupreous-brown medial band from costa to submedian fold; the terminal half of inner area orange-yellow with some metallic silver at middle of inner margin; a line sinuous black-brown subterminal line from apex to above tornus; five partly confluent ocellate black spots on termen with metallic silver points between them and orange-yellow points on termen; cilia cupreous brown at base, white tinged with brown at tips.

♀. Head with dark bar behind antennæ; thorax tinged with ochreous brown; abdomen yellower; fore wing with the base and costal area redder brown, an oblique red-brown medial band, the yellow terminal area defined on inner side by two red-brown lines, angled inwards to lower angle of cell; hind wing with oblique orange-yellow medial band defined at sides by cupreous-brown lines, the postmedial area more strongly irrorated, the subterminal line more distinct and defined on each side by yellowish white, the terminal ocellate spots better defined and separate.

*Hab.* QUEENSLAND, Cooktown. Cedar Bay (*Meek*), 1 ♂ type. Kuranda (*Dodd*), 1 ♀. *Exp.*, ♂ 14, ♀ 16 mm.

[To be continued.]

XXXIV.—A Revision of the Clupeid Fishes of the Genera *Sardinella*, *Harengula*, &c. By C. TATE REGAN, M.A.

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THE genus *Clupea*, as understood by Günther, includes a number of genera which may be arranged in two groups: one of these, characterized by a well-marked median notch in the upper jaw, has been dealt with in a recent paper (*supra*, p. 297); the other group includes genera without a distinct notch in the upper jaw, namely, *Clupea*, *Clupeonella*, *Sardinia*, *Sardinella*, *Opisthonema*, *Harengula*, *Lile*, and *Heringia*. Of these I have already published revisions of *Clupea* and *Sardinia* ('Annals,' (8) xviii. 1916, p. 1, and xix. 1917, p. 226), and I have nothing to add to Berg's synopsis of *Clupeonella* (*Harengula*, Berg, 'Annals,' (8) xi. 1913, p. 480, and Poiss. de l'eau douce de la Russie, p. 30, 1916). The other genera, comprising species that are mostly tropical and strictly marine, form the subject of the present paper.

SARDINELLA, Val. 1847.

Cuv. & Val. Hist. Nat. Poiss. xx. p. 263.  
*Clupeonia*, Cuv. & Val. l. c. p. 345.

This genus is closely related to *Sardinia*, Antipa (Regan, Ann. & Mag. Nat. Hist. (8) xviii. 1916, p. 11), from which it differs especially in the absence of radiating grooves on the operculum and in the structure of the posterior margin of the branchial chamber, the vertical edge of the cleithrum being covered by a dermal fold which bears two obtusely pointed projections some distance apart, with a shallow concavity between them. The vertebrae are fewer than in *Sardinia*, numbering 41 in *S. gibbosa*, 45 in *S. sindensis*, and 46 in *S. longiceps* and *S. maderensis*.

The majority of the species are tropical, but those of the Eastern Atlantic range into the Mediterranean; most of them are of considerable economic value, both as food-fishes and as a source of oil.

Synopsis of the Species.

- I. Ventral scutes sharply keeled.
  - A. Pelvic fins 9-rayed; a dark spot at edge of operculum.
 

Eye $\frac{3}{4}$ to $4\frac{1}{2}$ in length of head, which is $3\frac{3}{4}$ to 4 in	
length of fish; 110-160 gill-rakers on lower	
part of anterior arch .....	I. <i>aurita</i> .

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Eye 5 to 6 in length of head, which is 3 to  $3\frac{1}{2}$  in length of fish; 180-250 gill-rakers on lower part of anterior arch..... 2. *longiceps*.

B. Pelvic fins 8-rayed; a dark spot at base of anterior rays of dorsal fin.

1. Mediterranean and West African species.

Depth  $3\frac{1}{2}$  to 4 in length; 60 to 95 gill-rakers on lower part of anterior arch (in specimens of 100 to 300 mm.)..... 3. *maderensis*.

Depth  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in length; 110 to 130 gill-rakers on lower part of anterior arch (in specimens of 100 to 200 mm.)..... 4. *eba*.

Depth 3 in length; 90 to 100 gill-rakers on lower part of anterior arch (in specimens of 170 to 200 mm.)..... 5. *cameroensis*.

2. Indo-Pacific species.

Depth  $2\frac{3}{4}$  in length; 130 gill-rakers on lower part of anterior arch..... 6. *dayi*.

Depth  $2\frac{1}{2}$  to 3; gill-rakers 55 to 65; diameter of eye 3 to  $3\frac{1}{2}$  in length of head..... 7. *brachycephala*.

Depth 3; gill-rakers 18 to 55; diameter of eye  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in length of head..... 8. *perforata*.

Depth 3 to  $3\frac{1}{2}$ ; gill-rakers 70 to 75..... 9. *finlandica*.

Depth  $3\frac{1}{2}$  to 4; gill-rakers 58 to 62..... 10. *stadenensis*.

Depth  $3\frac{1}{2}$  to 4; gill-rakers 50 to 55..... 11. *gibbosa*.

Depth  $3\frac{1}{2}$  to 4; gill-rakers 38 to 44..... 12. *melanura*.

II. Ventral scutes feebly keeled.

Maxillary nearly or quite reaching to below eye; 36 to 40 gill-rakers on lower part of anterior arch; pelvic below anterior half of dorsal..... 13. *simi*.

Maxillary not reaching eye; 27 to 34 gill-rakers on lower part of anterior arch; pelvic below origin of dorsal..... 14. *clupeoides*.

### 1. *Sardinella aurita*:

♀ *Clupea caeruleo-ristata*, Richards, Ichth. China, p. 305 (1846)\*.

*Sardinella aurita*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 263, pl. 504 (1817).

*Sardinella anchora*, Cuv. & Val. l. c. p. 269.

*Meletta mediterranea*, Cuv. & Val. l. c. p. 369.

*Sardinella lemuru*, Bleek. Nat. Tijdschr. Ned. Ind. v. 1853, p. 500.

♀ *Sardinia pseudohispanica*, Poey. Mem. Cuba, ii. p. 311 (1860).

*Clupea aurita*, Günth. Cat. Fish. vii. p. 420 (1868).

*Clupea anchovia*, Günth. l. c. p. 421.

*Clupea melanosticta*, Günth. l. c. p. 430.

*Clupea lemuru*, Günth. l. c. p. 430; Bleek. Atl. Ichth. vi. p. 108, Clup. pl. ix, fig. 1 (1872).

♀ *Clupea pseudohispanica*, Günth. l. c. p. 442.

*Clupea brasiliensis*, Steind. Sitzungsbl. Akad. Wien, lxxx. 1880, p. 182.

\* Richardson's description is based on a coloured figure by Reeves probably, but not certainly, intended to represent this species.

*Chapanodon pseudohispanicus*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 423.

*Sardinella anchora*, Jord. & Everm. *t. c.* p. 429.

*Copea immaculata*, Kishinouye, Journ. Imp. Fisheries Bureau Tokyo, xiv. 1907, p. 96, pl. xix. fig. 1.

*Sardinella curvina*, Antipa, Denkschr. Akad. Wien, lxxviii. 1906, p. 46 pl. iii. fig. 12.

*Copea longiceps*, Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 82 (1913).

Depth of body 4 to  $5\frac{1}{4}$  in the length, length of head  $3\frac{1}{2}$  to 4. Snout as long as or longer than diameter of eye, which is  $3\frac{1}{2}$  to  $4\frac{1}{2}$  in the length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye; a patch of teeth on the tongue. 110 (young) to 160 gill-rakers on lower part of anterior arch. About 48 scales in a longitudinal series, 12 to 14 in a transverse series; ventral scutes sharply keeled, 18-20 + 13-15. Dorsal 16-20. Anal 15-19. Pelvics 9-rayed, inserted below or behind middle of dorsal. A dark spot at edge of operculum. Vertebrae 47 or 48.

Cape Cod to Rio Janeiro; Black Sea and Mediterranean; Indo-Australian Archipelago, China, and Southern Japan.

The description is based on eight specimens, 120 to 180 mm. long, from Havana, Trinidad, and Rio de Janeiro (*S. anchora*), several of 110 to 130 mm. from Algiers, the type of *S. lineata* from Java (145 mm. long) and two examples from China, 180 mm. long (*C. melanosticta*, Günth.). In a very small fish (75 mm.) I count 80 gill-rakers on the lower part of the anterior arch.

The discontinuous distribution of this species is remarkable; in the Indian Ocean it is represented by the allied *S. longiceps*.

## 2. *Sardinella longiceps*.

*Sardinella longiceps*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 273 (1847).

*Sardinella neoharrii*, Cuv. & Val. *t. c.* p. 274.

*Acanthoscambria*, Cuv. & Val. *t. c.* p. 442.

*Copea longiceps*, Günth. Cat. Fish. vii. p. 428 (1868); Day, Fish. India, p. 337.

*Copea scambria*, Günth. *t. c.* p. 448.

Depth of body 4 to  $4\frac{2}{3}$  in the length, length of head 3 to  $3\frac{1}{2}$ . Snout longer than diameter of eye, which is 5 to 6 in the length of head; maxillary extending to below anterior part or nearly to middle of eye. 180 to 250 gill-rakers on lower part of anterior arch. 46 to 48 scales in a longitudinal series, 12 or 13 in a transverse series; ventral scutes sharply keeled, 18-21 + 13-15. Dorsal 16-18. Anal 14-16. Pelvics 9-rayed, below or behind middle of dorsal. A dark spot at edge of operculum. Vertebrae 47.

Indian Ocean.

Several specimens, 120 to 180 mm. in total length, from Mombasa, Muscat, and India.

### 3. *Sardinella maderensis*.

*Clupea maderensis*, Lowe, Trans. Zool. Soc. ii. 1839, p. 189.

? *Sardinella granigera*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 267 (1847).

*Clupea maderensis* (part.), Günth. Cat. Fish. vii. p. 440 (1868).

Depth of body  $3\frac{2}{3}$  to 4 in the length, length of head  $3\frac{1}{3}$  to  $4\frac{1}{4}$ . Snout as long as or a little longer than diameter of eye, which is  $3\frac{1}{2}$  to 4 in length of head; maxillary extending to below anterior  $\frac{1}{4}$  of eye. 60 to 95 gill-rakers on lower part of anterior arch. 48 to 50 scales in a longitudinal, 12 or 13 in a transverse series; ventral scutes 19-20 + 14-16. Dorsal 18-19. Anal 18-19. Pelvics 8-rayed, a little in advance of middle of dorsal. A dark spot at base of anterior dorsal rays. Vertebrae 48.

Eleven specimens, 110 to 300 mm. in total length, from Madeira, Cape Verde Is., and Mogadore.

If *S. granigera* be this species, it occurs in the Mediterranean.

### 4. *Sardinella eba*.

*Alosa eba*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 309 (1847).

*Clupea maderensis* (part.), Günth. Cat. Fish. vii. p. 440 (1868).

Depth of body  $3\frac{1}{3}$  to  $3\frac{2}{3}$  in the length, length of head  $3\frac{2}{3}$  to 4. Snout as long as diameter of eye, which is  $3\frac{1}{3}$  to 4 in the length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye or a little beyond. 110 to 130 gill-rakers on lower part of anterior arch. 44 to 46 scales in a longitudinal, 11 to 13 in a transverse series; ventral scutes 18-19 + 14. Dorsal 18-20. Anal 17-22. Pelvics 8-rayed, below middle of dorsal. A dark spot at base of anterior dorsal rays. Vertebrae 46.

Mediterranean; West Africa.

Eight specimens, 110 to 200 mm. in total length, from Egypt, Algiers, and Nigeria.

### 5. *Sardinella cameronensis*, sp. n.

*Clupea senegalensis* (non Benn.), Günth. Cat. Fish. vii. p. 441 (1868)\*.

Depth of body 3 in the length, length of head 4. Snout

\* *Alosa senegalensis*, Bennett (Proc. Zool. Soc. i. 1831, p. 147), is probably a synonym of *Sardina pilchardus*.

as long as diameter of eye, which is  $3\frac{3}{8}$  in length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye. 90 to 100 gill-rakers on lower part of anterior arch. 44 scales in a longitudinal, 13 in a transverse series; ventral scutes 18-19+14. Dorsal 18-19. Anal 20-21. Pelvics 8-rayed, below middle of dorsal. Caudal lobes long,  $\frac{1}{3}$  length of fish. A dark spot at base of anterior dorsal rays. Vertebrae 46.

Two specimens, 170 and 200 mm. in total length, from Camaroon.

#### 6. *Sardinella dayi*, sp. n.

Depth of body  $2\frac{3}{4}$  in the length, length of head  $3\frac{1}{2}$ . Snout as long as diameter of eye, which is  $3\frac{3}{8}$  in length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye. 130 gill-rakers on lower part of anterior arch. 41 scales in a longitudinal and 12 in a transverse series; ventral scutes 19+13. Dorsal 18, nearly equidistant from end of snout and base of caudal. Anal 19. Pelvics 8-rayed, below middle of dorsal. Pectoral  $\frac{3}{4}$  length of head. Silvery; back darker; a blackish spot at base of anterior dorsal rays; upper part of dorsal and edge of caudal dusky.

A single specimen, 125 mm. long, from Karwar, India, presented by N. B. Kinnear, Esq. The species is named in memory of Dr. Francis Day.

#### 7. *Sardinella brachysoma*.

: *Kowala albellia*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 362, pl. 602 (1847).

*Sardinella brachysoma*, Bleek. Verh. Bat. Gen. xxiv. 1852, Haringnacht. p. 19.

*Harengula hypselosoma*, Bleek. Nat. Tijdschr. Ned. Ind. viii. 1855, p. 427.

*Clupea brachysoma*, Günth. Cat. Fish. vii. p. 423 (1868); Bleek, Atl. Ichth. vi. p. 194, Clup. pl. ix. fig. 4 (1872); Day, Fish. India, p. 635, pl. cxliii. fig. 3 (1878); Weber & Beaufort, Fish. Indo-Austral. Archipel. ii. p. 70, fig. 25 (1913).

*Clupea hypselosoma*, Günth. l. c. p. 431; Bleek, l. c. pl. ix. fig. 2.

Depth of body  $2\frac{1}{2}$  to 3 in the length, length of head 4 to 4 $\frac{1}{2}$ . Snout shorter than diameter of eye, which is 3 to  $3\frac{1}{4}$  in length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye or a little beyond. 55 to 65 gill-rakers on lower part of anterior arch. 40 to 44 scales in a longitudinal and 12 or 13 in a transverse series; ventral scutes 17-20+12-13. Dorsal 17-20. Anal 18-22. Pelvics 8-rayed, below or in advance of middle of dorsal. A dark spot at base of dorsal; upper part of dorsal and ends of caudal lobes often dusky.

India; Malay Archipelago.

Seven examples, 100 to 150 mm. in length, from Madras, Java, and Amboina, including the types of the species and of *H. hypselosoma*.

#### 8. *Sardinella perforata*.

*Clupeonia perforata*, Cantor, J. As. Soc. Bengal, xviii. 1850, p. 1276.  
*Clupulosa bulan*, Bleek, Verh. Bat. Gen. xxii. 1849, Madura, p. 12.  
*Spratella kowala*, Bleek, Nat. Tijdschr. Ned. Ind. ii. 1851, p. 492.  
*Clupea perforata*, Günth. Cat. Fish. vii. p. 124 (1868); Bleek, Atl. Ichth. vi. p. 110, Clup. pl. x. fig. 2 (1872); Weber & Beaufort, Indo-Austral. Arch. Fish. ii. p. 74 (1913).  
*Clupea bulan*, Bleek, Atl. Ichth. vi. p. 110, Clup. pl. viii. fig. 5 (1872).

Depth of body about 3 in the length, length of head 4 to 4½. Snout as long as or a little shorter than diameter of eye, which is 3½ to 3¾ in length of head; maxillary extending to below anterior ⅓ of eye. 48 to 55 (58) gill-rakers on lower part of anterior arch. About 44 scales in a longitudinal, 12 or 13 in a transverse series; ventral scutes 17-20 + 10-13. Dorsal 17-20. Anal 17-20. Pelvies 8-rayed, below or in advance of middle of dorsal. A dark spot at base of anterior dorsal rays.

Indian Ocean and Archipelago.

Several specimens, 90 to 130 mm. in total length, including types of the species, of *S. kowala*, and *C. bulan*, from the Persian Gulf and the Malay Archipelago.

#### 9. *Sardinella fimbriata*.

*Spratella fimbriata*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 359, pl. 690 (1847).  
*Kowala lanta*, Cantor, J. As. Soc. Bengal, xviii. 1850, p. 1278.  
*Clupea fimbriata*, Günth. Cat. Fish. vii. p. 127 (1868).

Depth of body 3 to 3½ in the length, length of head 4. Snout as long as diameter of eye, which is 3½ to 3¾ in length of head; maxillary extending to below anterior ⅓ of eye or a little beyond. 70 to 75 gill-rakers on lower part of anterior arch. About 45 scales in a longitudinal and 12 in a transverse series; ventral scutes 18-19 + 12-13. Dorsal 18-19. Anal 18-21. Pelvies 8-rayed, in advance of middle of dorsal. A dark spot at base of anterior dorsal rays; upper part of dorsal and posterior edge of caudal dusky.

Sea of Bengal.

Four specimens, 110 to 125 mm. long, from Akyab, Orissa, Malabar, and Madras (*Day*), and the types of *K. lanta* (skins) from Pinang.

10. *Sardinella sindensis*.

*Clupea sindensis*, Day, Fish. India, p. 633, pl. cxliii, fig. 2 (1878).

Depth of body  $3\frac{1}{4}$  to 4 in the length, length of head  $3\frac{3}{4}$  to 4. Snout as long as or shorter than diameter of eye, which is  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in the length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye. 58 to 66 gill-rakers on lower part of anterior arch. 44 to 48 scales in a longitudinal, 11 to 13 in a transverse series; ventral scutes 17-19 + 12-15. Dorsal 17-19. Anal 18-21. Pelvics 8-rayed, below or in advance of middle of dorsal. A dark spot at base of anterior dorsal rays; upper part of dorsal and ends of caudal lobes sometimes blackish.

Indian Ocean and Archipelago.

Thirteen specimens, 95 to 130 mm. in total length, from Sind, Bombay, Amboina, and Formosa.

11. *Sardinella gibbosa*.

† *Clupanodon jussieu*, Lacép. Hist. Nat. Poiss. v. pp. 463, 474, pl. xi, fig. 2 (1803).

† *Clupeoida jussieu*, Cuv. & Val. Hist. Nat. Poiss. p. 346 (1847); Sauvage, Hist. Madagascar Poiss. p. 495.

† *Clupeoida fasciata*, Cuv. & Val. t. c. p. 349.

*Clupea gibbosa*, Bleek. Journ. Ind. Arch. iii. 1849, p. 72; and Atl. Ichth. vi. p. 106, Clap. pl. viii, fig. 6 (1872).

*Spratella tembang*, Bleek. Verh. Bat. Gen. xxiv. 1852, Haringacht. p. 28.

*Clupea tembang* (part.), Günth. Cat. Fish. vii. p. 426 (1868).

*Clupea finibriata* (part.), Day, Fish. India, p. 637; Weber & Beaufort, Fish. Indo-Austral. Arch. ii. p. 75, fig. 26 (1913).

Depth of body  $3\frac{1}{2}$  to 4 in the length, length of head 4 to 4 $\frac{1}{2}$ . Snout as long as or longer than diameter of eye, which is  $3\frac{1}{2}$  to 4 in length of head; maxillary extending to below anterior  $\frac{1}{4}$  or  $\frac{1}{3}$  of eye. 50 to 55 gill-rakers on lower part of anterior arch. 44 to 48 scales in a longitudinal, 11 to 13 in a transverse series; ventral scutes 18-20 + 13-15. Dorsal 17-20. Anal 17-19. Pelvics 8-rayed, somewhat in advance of middle of dorsal. A dark spot at base of anterior dorsal rays; upper part of dorsal and posterior edge of caudal often dusky.

Indian Ocean and Archipelago.

Eleven specimens, 100 to 160 mm. in total length, from Indian, Mombasa, Ganjam, Madras, Siam, Celebes, Java, and Amboyna, including the type of *S. tembang*.



12. *Sardinella melanura*.

*Clupanodon sinensis*, var., Lacep. Hist. Nat. Poiss. v. pl. xi. fig. 3 (1803).

*Clupea melanura*, Cuv. Règne Anim. ed. 2, ii. p. 318 (1829).

*Clupeonia commersoni*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 350 (1847);

Sauvage, Hist. Madagascar Poiss. p. 494 (1891).

*Spratella fimbriata*, Bleek. Verh. Batav. Genootsch. xxiv. 1852, Haringacht, p. 27.

*Harengula melanurus*, Bleek. Nat. Tijdschr. Ned. Ind. v. 1853, p. 245.

*Clupea atricauda*, Günth. Cat. Fish. vii. p. 426 (1863); Bleek. Atl. Ichth. vi. p. 106, Clup. pl. x. fig. 5 (1878); Day, Fish. India, p. 636, pl. cxiv. fig. 5 (1878); Weber & Beaufort, Fish. Indo-Austral. Arch. ii. p. 80 (1913).

*Clupea sundaica*, Bleek. Atl. Ichth. vi. p. 105, Clup. pl. xiii. fig. 5 (1872).

? *Harengula melanura*, Sauvage, Hist. Madagascar Poiss. p. 492, pl. xlviii. fig. 4.

Depth of body  $3\frac{1}{2}$  to 4 in the length, length of head 4 to  $4\frac{1}{2}$ . Snout as long as or a little longer than diameter of eye, which is  $3\frac{1}{2}$  to 4 in the length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye. 38 to 41 gill-rakers on lower part of anterior arch. 44 to 46 scales in a longitudinal series, 12 or 13 in a transverse series; ventral scutes sharply keeled, 19-20+13. Dorsal 18-19. Anal 16-18. Pelvics 8-rayed, below or a little in advance of middle of dorsal. A dark spot at base of anterior dorsal rays; ends of caudal lobes usually blackish.

Indian Ocean and Archipelago.

Four specimens, 115 to 160 mm. in total length, including two received from Dr. Bleeker as *H. melanurus* and *S. fimbriata*, which appear to be the specimens figured as *C. atricauda* and *C. sundaica*.

13. *Sardinella sirm*.

*Clupea sirm*, Rüpp. Neue Wirbelth. Fische, p. 77, pl. xxi. fig. 1 (1835-40); Günth. Cat. Fish. vii. p. 425 (1863); Weber & Beaufort, Fish. Indo-Austral. Archipel. ii. p. 62 (1913).

*Sardinella leugaster*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 270 (1847).

*Sardinella leugastroides*, Bleek. Nat. Tijdschr. Ned. Ind. vii. 1854, p. 255.

*Clupea leugaster*, Bleek. Atl. Ichth. vi. p. 102, Clup. pl. iv. fig. 6 (1872); Kuhnzing, Zool. Bot. Ges. Wien, xxi. 1871, p. 598; Weber & Beaufort, t. c. p. 61.

*Clupea leugastroides*, Bleek. l. c. Clup. pl. xiv. fig. 2.

*Clupea pignis*, Günth. Ann. & Mag. Nat. Hist. x. 1872, p. 425, and Brenchley's Cruise of the 'Curacon,' p. 426 (1873); Weber & Beaufort, t. c. p. 63.

Depth of body  $4\frac{1}{2}$  to 5 in the length, length of head 4 to  $4\frac{1}{2}$ . Snout longer than diameter of eye, which is  $3\frac{2}{3}$  to  $4\frac{1}{2}$  in the length of head; maxillary nearly or quite reaching

vertical from anterior margin of eye. 36 to 40 gill-rakers on lower part of anterior arch. 42 to 45 scales in a longitudinal, 12 in a transverse series; ventral scutes 16-18+13-15. Dorsal 17-19. Anal 17-20. Pelvics 8-rayed, in advance of middle of dorsal.

Indian Ocean and Archipelago.

Six specimens, 105 to 185 mm. in total length, from Zanzibar, Batavia, Celebes, and Misol, including types of *S. tiogastroides* and *C. pinguis*.

#### 14. *Sardinella clupeioides*.

*Amblygaster clupeioides*, Bleek. Journ. Ind. Arch. 1849, p. 73.

*Clupea clupeioides*, Günth. Cat. Fish. vii. p. 425 (1868); Bleek. Atl. Ichth. vi. p. 103, Clup. pl. xiv. fig. 1 (1872); Weber & Beaufort, Fish. Indo-Austral. Archipel. ii. p. 63 (1913).

*Clupea okinawensis*, Kishinouye, Journ. Imp. Fisheries Bureau, Tokyo, xiv. 1907, p. 96, pl. xix. fig. 2.

Depth of body  $3\frac{3}{4}$  to  $4\frac{1}{2}$  in the length, length of head 4 to  $4\frac{1}{2}$ . Snout as long as or a little longer than diameter of eye, which is  $3\frac{1}{2}$  to 4 in length of head; maxillary not extending to below eye. 27 to 31 gill-rakers on lower part of anterior arch. 42 to 44 scales in a longitudinal, 12 in a transverse series; ventral scutes 16-17+12-14. Dorsal 17-19. Anal 16-18. Pelvics 8-rayed, nearly below origin of dorsal.

Malay Archipelago to Riu-Kiu Islands.

Two specimens, 160 and 230 mm. long, the latter the type of the species.

#### OPISTHONEMA, Gill, 1861.

Proc. Acad. Philadelphia, p. 37.

Differs from *Sardinella* in that the last ray of the dorsal fin is prolonged into a filament.

Two species from Tropical America.

##### 1. *Opisthonema oglinum*.

*Clupea thrissa* (non Linn.), Broussonet, Ichth. fasc. 1 (1872); Günth. Cat. Fish. vii. p. 432 (1868).

*Megolops oglinac*, Lesueur, J. Ac. Philad. i. 1817, p. 359.

*Opisthoacma oglinum*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 432.

Depth of body  $2\frac{4}{5}$  to  $3\frac{3}{5}$  in the length, length of head 4 to  $4\frac{1}{2}$ . Snout as long as or a little longer than diameter of eye, which is  $3\frac{1}{3}$  to 4 in length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye. 65 (young) to 100 gill-rakers on lower part of anterior arch. 48 to 50 scales in a longitudinal,

15 or 16 in a transverse series; ventral scutes 17-20 + 13-16, Dorsal 18-20. Anal 22-25. Pelvics 8-rayed, a little in advance of middle of dorsal.

Carolina to Brazil.

Several examples, 85 to 275 mm. in total length.

## 2. *Opisthonema libertatis*.

*Meletta libertatis*, Günth. Proc. Zool. Soc. 1860, p. 603.

*Clupea libertatis*, Günth. Cat. Fish. vii. p. 433 (1868).

*Opisthonema libertate*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 133.

*Clupea (Opisthonema) bulleri*, Regan, Ann. & Mag. Nat. Hist. (7) xiii. 1904, p. 255.

Depth of body 3 to  $3\frac{1}{2}$  in the length, length of head  $3\frac{1}{2}$  to  $4\frac{1}{2}$ . Snout as long as or longer than diameter of eye, which is  $3\frac{1}{2}$  to 5 in the length of head; maxillary extending to below anterior  $\frac{1}{2}$  or nearly to middle of eye. 85 (young) to 165 gill-rakers on lower part of anterior arch. 48 to 50 scales in a longitudinal, 14 to 16 in a transverse series; ventral scutes 17-19 + 14-16. Dorsal 17-19. Anal 19-21. Pelvics 8-rayed, a little in advance of middle of dorsal.

Pacific coast of Mexico and Central America; Galapagos Islands.

Several examples, 75 to 250 mm. in total length.

## HARENGULA, Val. 1847.

Cur. & Val. Hist. Nat. Poiss. xx. p. 277.

This genus has never been properly distinguished from *Sardinella*, but they differ in some important characters. In *Sardinella*, as in *Sardina*, the two last rays of the anal fin are enlarged and the transverse grooves on the scales are paired, their inner ends separated by an interspace. In *Harengula* the posterior anal rays are equal and the transverse grooves on the scales are continuous; moreover, the lower jaw is more prominent and the sheath at the base of the dorsal fin is lower than in *Sardinella*. I count 39 vertebrae in *H. dispilonotus*, 40 in *H. maculosa* and *H. castelnaui*, 41 in *H. pensacola*, 42 in *H. schrammi*, 43 in *H. zunasi*, 43 or 44 in *H. macrophthalma*, and 44 in *H. punctata*.

Like *Sardinella*, this genus occurs in the tropical Indo-Pacific; but whereas *Sardinella* has four West African and Mediterranean and only one Antillean species, *Harengula* has four species on the coasts of Tropical America, but is absent from the eastern Atlantic.

The species are mostly smaller and of less economic value than those of *Sardinella*, and some of them are reputed poisonous [cf. Cuv. & Val. xx. p. 295 (*H. humeralis*=*macrophthalma*) and p. 377 (*Meletta venenosa*=*H. punctata*)].

*Synopsis of the Species.*

- I. American.
  - A. 27 to 33 gill-rakers on lower part of anterior arch.
    - i. Depth of operculum 2, diameter of eye  $2\frac{3}{4}$  to 3 in length of head; depth of body 3 to  $3\frac{1}{2}$  in the length.
      1. *maculosa*.
    - ii. Depth of operculum more than  $\frac{1}{2}$  length of head, diameter of eye 3 to  $3\frac{1}{2}$  in length of head.
      - And of 16-19 rays. Depth  $3-3\frac{3}{4}$  in the length, head  $3\frac{1}{2}$  to  $3\frac{3}{4}$  ..... 2. *macrophthalma*.
      - And of 15 rays. Depth  $2\frac{5}{8}$  (  $3\frac{1}{2}$  ) in the length, head  $3\frac{1}{2}$  ..... 3. *thrissina*.
  - B. 33 to 36 gill-rakers on lower part of anterior arch; depth of operculum  $\frac{1}{2}$  to  $\frac{3}{4}$  length of head; eye  $2\frac{3}{4}$  to 3 in head; depth of body  $2\frac{3}{4}$  to  $2\frac{5}{8}$  in the length ..... 4. *pusculole*.
- II. Indo-Pacific.
  - A. 35 gill-rakers on lower part of anterior arch; 36 to 38 scales in a longitudinal series ..... 5. *displanotus*.
  - B. 30 to 34 gill-rakers on lower part of anterior arch; 40 to 45 scales in a longitudinal series.
    - Depth of body  $2\frac{3}{4}$  in the length ..... 6. *königsbergeri*.
    - Depth of body  $3\frac{1}{2}$  to 4 in the length, length of head  $3\frac{1}{2}$  to 4; eye 3 to  $3\frac{1}{2}$  in length of head ..... 7. *punctata*.
    - Depth of body 4 to  $4\frac{1}{2}$  in the length, length of head 4 to  $4\frac{1}{2}$ ; eye  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in length of head ..... 8. *schrammi*.
  - C. More than 40 gill-rakers on lower part of anterior arch.
    1. Depth of body  $2\frac{1}{2}$  to  $3\frac{1}{2}$  in length; eye 3 in length of head; 45 gill-rakers on lower part of anterior arch.
      9. *castelnaui*.
    2. Depth of body 3 to 4 in length; eye  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in length of head.
      - At least 50 gill-rakers on lower part of anterior arch; 40 to 42 scales in a longitudinal series; ends of caudal lobes blackish ..... 10. *cittata*.
      - At least 50 gill-rakers on lower part of anterior arch; 44 to 46 scales in a longitudinal series; caudal fin uniform ..... 11. *zunasi*.
      - 70 gill-rakers on lower part of anterior arch ..... 12. *nynphesca*.

1. *Harengula maculosa*.

- Harengula maculosa*, Cuv. & Val. Hist. Nat. Poiss. xx. 1847, p. 292.  
*Isoscapicalis*, Müll. & Trosch. in Schomburgk, Hist. Barbadoes, p. 673 (1848).  
*Harengula jaguana*, Poey. Rep. I. p. 190 (1866).  
*Cyprina macrophthalma*, Günth. Cat. Fish. vii. p. 121.

*Sardinella sardina*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 430.

*Sardinella macrophthalmus*, Jord. & Everm. *l. c.*

Depth of body 3 to  $3\frac{1}{2}$  in the length, length of head  $3\frac{1}{2}$  to  $3\frac{3}{4}$ . Snout shorter than or nearly as long as diameter of eye, which is  $2\frac{3}{4}$  to 3 in the length of head and greater than its distance from lower edge of præoperculum; maxillary extending to below anterior part or middle of eye; depth of operculum  $\frac{1}{2}$  length of head. 27 to 33 gill-rakers on lower part of anterior arch. About 40 scales in a longitudinal and 11 in a transverse series; ventral scutes 15-17+10-12. Dorsal 17-19. Anal 17-19. Pelvics 8-rayed, below middle of dorsal. Anterior part of dorsal blackish superiorly. Vertebrae 40.

Several examples, 90 to 200 mm. in total length, from Florida, the Bermudas, and the West Indies.

## 2. *Harengula macrophthalmus*.

*Clupea macrophthalmus*, Rauzani, Nov. Com. Ac. Sc. Inst. Bonon. v. 1842, p. 320, pl. xxiii.

*Harengula latulus*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 280, pl. 565 (1847).

*Harengula clupeola*, Cuv. & Val. *t. c.* p. 289.

*Harengula humeralis*, Cuv. & Val. *t. c.* p. 293.

*Alosa striata*, Cuv. & Val. *t. c.* p. 429.

*Alosa bishopi*, Müll. & Trosch. in Schomburgk, Hist. Barbadoes, p. 675 (1848).

*Harengula sardina*, Poey, Mem. ii. p. 310 (1860).

*Clupea humeralis* (part.), Günth. Cat. Fish. vii. p. 422 (1868).

*Sardinella humeralis* (part.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 431.

Depth of body 3 to  $3\frac{3}{4}$  in the length, length of head  $3\frac{1}{2}$  to  $3\frac{3}{4}$ . Snout shorter than diameter of eye, which is 3 to  $3\frac{1}{2}$  in the length of head and not greater than its distance from lower edge of præoperculum; maxillary extending to below anterior  $\frac{1}{2}$  of eye or beyond; depth of operculum more than  $\frac{1}{2}$  length of head. 29 to 33 gill-rakers on lower part of anterior arch. About 42 scales in a longitudinal and 11 in a transverse series; ventral scutes 16-19+12-14. Dorsal 16-19. Anal 16-19. Pelvics 8-rayed, below middle of dorsal. A dark humeral spot. Vertebrae 43-44.

Atlantic coast of Tropical America\*.

Numerous examples, 80 to 150 mm. in total length, from Florida, the West Indies, Fernando Noronha, and Bahia.

\* Valenciennes described *H. latula* as a European species; it is probable that this was a mistake, although it is not impossible that the species may cross the Atlantic.

### 3. *Harengula thrissina*.

*Clupea thrissina*, Jord. & Gilb. Proc. U.S. Nat. Mus. 1882, p. 353.

*Sardinella thrissina*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 430.

Depth of body  $2\frac{5}{8}$  ( $-3\frac{1}{2}$ ) in the length, length of head  $3\frac{3}{4}$ . Snout a little shorter than diameter of eye, which is  $3\frac{1}{4}$  in the length of head and rather less than its distance from lower edge of præoperculum; maxillary extending a little beyond anterior  $\frac{1}{2}$  of eye; depth of operculum more than  $\frac{2}{3}$  length of head. 30 gill-rakers on lower part of anterior arch. 40 scales in a longitudinal and 12 in a transverse series; ventral scutes 18+11 (16+13). Dorsal 17. Anal 15. Pelvies 8-rayed, below middle of dorsal. A dark humeral spot.

Pacific coast of Mexico.

A single specimen, 115 mm. in total length, from Jalisco.

### 4. *Harengula pensacole*.

*Clupea humeralis* (part.), Günth. Cat. Fish. vii. p. 422 (1868).

*Harengula pensacole*, Goode & Bean, Proc. U.S. Nat. Mus. 1879, p. 152.

*Sardinella humeralis* (part.), Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 431.

*Sardinella sardina*, Jord. & Everm. t. c. 1900, fig. 193.

Depth of body  $2\frac{3}{5}$  to  $2\frac{4}{5}$  in the length, length of head  $3\frac{2}{3}$  to  $3\frac{4}{5}$ . Snout shorter than diameter of eye, which is  $2\frac{2}{3}$  to 3 in length of head and equal to its distance from lower edge of præoperculum; maxillary extending to below anterior  $\frac{1}{3}$  of eye or beyond; depth of operculum  $\frac{2}{3}$  to  $\frac{3}{5}$  length of head. 33 to 36 gill-rakers on lower part of anterior arch. About 40 scales in a longitudinal and 11 in a transverse series; ventral scutes 16-17+13. Dorsal 16-18. Anal 16-18. Pelvies 8-rayed, below middle of dorsal. Vertebrae 41.

Four specimens, 80 to 140 mm. in total length, from Florida and Trinidad.

### 5. *Harengula dispilonotus*.

*Harengula dispilonotus*, Bleek. Nat. Tijdschr. Ned. Ind. iii. 1852, p. 456.

*Clupea dispilonotus*, Günth. Cat. Fish. vii. p. 429 (1868); Bleek. Atl.

Fish. vi. p. 111, Clup. pl. iii. fig. 3 (1872); Weber & Beaufort, Fish. Indo-Austral. Arch. ii. p. 69 (1913).

Depth of body 3 to  $3\frac{1}{2}$  in the length, length of head  $3\frac{2}{3}$  to 4. Snout a little shorter than diameter of eye, which is 3 in the length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye. 35 gill-rakers on lower part of anterior arch. 36 to 38 scales in a longitudinal, 11 or 12 in a transverse series;

ventral scutes 14-16 + 11-13. Dorsal 18-20. Anal 16-18. Pelvics below anterior  $\frac{1}{2}$  of dorsal. A dark spot or ocellus on back at base of posterior dorsal rays, a second behind it.

E. Indian Archipelago.

Six specimens, 75 to 100 mm. in total length, including the type of the species.

#### 6. *Harengula koningsbergeri*.

*Clupea koningsbergeri*, Weber & Beaufort, Verh. Akad. Amsterdam, xvii. no. 3, 1912, p. 14; Fish. Indo-Austral. Arch. ii. p. 72 (1913).

Depth of body  $2\frac{3}{4}$  in the length, length of head  $3\frac{1}{4}$ . Snout shorter than diameter of eye, which is  $2\frac{1}{4}$  in length of head; maxillary extending to below anterior  $\frac{1}{2}$  of eye or a little beyond. 33 gill-rakers on lower part of anterior arch. 42 scales in a longitudinal and 12 in a transverse series: ventral scutes 17-18 + 11-12. Dorsal 18-19. Anal 20-21. Pelvics below or a little in advance of middle of dorsal.

A specimen of 115 mm. from N.W. Australia, and one of 75 mm. from New Guinea; the species was described from the Ara Is.

#### 7. *Harengula punctata*.

*Clupea punctata*, Rüppell, Neue Wirbelth. Fische, p. 78, pl. xxi. fig. 2 (1840).

*Clupea quadrimaculata*, Rüppell, *t. c.* p. 78, pl. xxi. fig. 3.

*Sardinella lineolata*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 272 (1847).

*Harengula punctata*, Cuv. & Val. *t. c.* p. 297; Sauvage, Hist. Madagascar Poiss. p. 493 (1891).

*Harengula bipunctata*, Cuv. & Val. *t. c.* p. 298.

*Melitta obtusirostris*, Cuv. & Val. *t. c.* p. 375.

*Melitta venusta*, Cuv. & Val. *t. c.* p. 377.

*Harengula mabuccensis*, Bleek. Nat. Tijdschr. Ned. Ind. iv. 1853, p. 609.

*Harengula kunzei*, Bleek. id. xii. 1857, p. 200.

*Harengula spilargenteus*, Guichenot, in Maillard, He de la Réunion Poiss. p. 16 (1865); Sauvage, *op. cit.* p. 493, pl. xlviii. fig. 3.

*Clupea mabuccensis*, Günth. Cat. Fish. vii. p. 427 (1868); Bleek, Atl.

Ichth. vi. p. 107, Clap. pl. v. fig. 2 (1872); Weber & Beaufort, Fish. Indo-Austral. Arch. ii. p. 81 (1913).

*Clupea venusta*, Günth. *t. c.* p. 449; Weber & Beaufort, *t. c.* p. 77.

*Clupea kunzei*, Bleek. Atl. Ichth. vi. p. 107, Clap. pl. v. fig. 1 (1872); Day, Fish India, p. 636.

*Clupea dubia*, Bleek. *t. c.* p. 108.

*Harengula stereolepis*, Ogilby, Proc. Linn. Soc. N.S. Wales, xxii. 1897, p. 759.

*Clupea mizon*, Kishinouye, Journ. Imp. Fisheries Bureau, Tokyo, xiv. 1907, p. 98, pl. xx. fig. 3.

Depth of body  $3\frac{1}{2}$  to 4 in the length, length of head  $3\frac{1}{2}$  to 4. Snout as long as or shorter than diameter of eye, which

is 3 to  $3\frac{1}{2}$  in the length of head, equal to or greater than its distance from lower edge of preoperculum; maxillary extending to below anterior  $\frac{1}{2}$  of eye or a little beyond; depth of operculum about  $\frac{1}{2}$  length of head. 30 to 34 gill-rakers on lower part of anterior arch. 42 to 45 scales in a longitudinal, 11 or 12 in a transverse series; ventral scutes 16-20 + 11-14. Dorsal 17-19. Anal 17-19. Pelvics below or a little in advance of middle of dorsal. Anterior part of dorsal blackish superiorly. Vertebrae 44.

Tropical Indo-Pacific, from E. Africa to the Paumotu Archipelago.

Numerous examples, 60 to 130 mm. in total length, including the types of *H. moluccensis* and *H. kunzei*.

#### 8. *Harengula schrammi*.

*Alasa schrammi*, Bleek. Verh. Nat. Gen. xxii. 1849, Bali, p. 11.

*Clupea schrammi*, Bleek. Atl. Ichth. vi. p. 109, Clap. pl. xiv. fig. 3 (1872); Weber & Beaufort, Fish. Indo-Austral Arch. ii. p. 83 (1913).

Depth of body 4 to  $4\frac{1}{4}$  in the length, length of head 4 to  $4\frac{1}{2}$ . Snout a little longer than diameter of eye, which is  $3\frac{1}{2}$  to  $3\frac{3}{4}$  in the length of head; maxillary extending to below anterior  $\frac{1}{2}$  of eye. 32 to 34 gill-rakers on lower part of anterior arch. About 42 scales in a longitudinal and 12 in a transverse series; ventral scutes 17-18 + 12. Dorsal 18-19. Anal 18-19. Pelvics 8-rayed, below or a little in advance of middle of dorsal. Vertebrae 42.

Malay Archipelago.

Four specimens, 100 to 115 mm. in total length, from Mol and Gorum; with these I have compared the type, a small fish in bad condition.

#### 9. *Harengula castelnaui*.

*Korala castelnaui*, Ogilby, Proc. Linn. Soc. N.S.Wales, xxii. 1897, p. 66.

Depth of body  $2\frac{1}{2}$  to  $3\frac{1}{2}$  in the length, length of head about 4. Snout a little shorter than diameter of eye, which is 3 in the length of head; maxillary extending to below anterior  $\frac{1}{2}$  or middle of eye. 45 gill-rakers on lower part of anterior arch. 40 to 42 scales in a longitudinal, 12 in a transverse series; ventral scutes 16-19 + 10-13. Dorsal 17-19. Anal 18-21. Pelvics below middle or anterior  $\frac{1}{2}$  of dorsal. Tip of dorsal and ends of caudal lobes blackish.

New South Wales.

Nine specimens, 130 to 180 mm. in total length.



10. *Harengula vittata*.

*Clupeonia vittata*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 352 (1847).

*Alarca melanurus*, Cuv. & Val. t. c. p. 441.

*Clupeonia jussieu*, Cuv. & Val. op. cit. pl. 599.

*Clupea melanura*, Günth. Cat. Fish. vii. p. 449 (1868); Black. Atl. Ichth. vi. p. 111, Clup. pl. xi. fig. 5 (1872); Weber & Deaudon. Fish. Indo-Austral. Arch. ii. p. 72 (1913).

*Harengula vanicoris*, Jord. & Seale, Bull. U.S. Bureau Fisheries, xvi. 1906, p. 187.

*Clupea rechingeri*, Steind. Sitzungsab. Akad. Wien, cxv. 1906, p. 1424.

Depth of body  $3\frac{1}{3}$  to  $3\frac{2}{3}$  in the length, length of head  $3\frac{1}{3}$  to 4. Snout as long as diameter of eye, which is  $3\frac{1}{3}$  to  $3\frac{2}{3}$  in the length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye or beyond. 50 gill-rakers on lower part of anterior arch. 40 to 42 scales in a longitudinal, 12 in a transverse series; ventral scutes 17+13. Dorsal 16. Anal 18-19. Pelvics below anterior  $\frac{1}{2}$  of dorsal. Basal part of caudal dusky; ends of lobes blackish.

Indo-Pacific.

Two specimens, 80 and 90 mm. in total length, from Celebes and Raiatea.

11. *Harengula zunasi*.

*Clupea kowal* (non Rüpp.), Schleg. Faun. Japon. Poiss. p. 235, pl. vii. fig. 1 (1846).

*Harengula zunasi*, Bleek. Verh. Bat. Gen. xxvi. 1854, p. 117.

*Clupea kowal* (part.), Günth. Cat. Fish. vii. p. 450 (1868).

*Clupea zunasi*, Günth. t. c. p. 451; Kishinouye, Journ. Imp. Fisheries Bureau, Tokyo, xiv. 1907, p. 98, pl. xx. fig. 4.

Depth of body  $3\frac{1}{5}$  to  $3\frac{1}{3}$  in the length, length of head 4 to  $4\frac{1}{2}$ . Snout nearly as long as or shorter than diameter of eye, which is  $3\frac{1}{3}$  to  $3\frac{2}{3}$  in the length of head; maxillary extending to below anterior  $\frac{1}{3}$  of eye or beyond. About 50 gill-rakers on lower part of anterior arch. 42 to 46 scales in a longitudinal series, 11 or 12 in a transverse series; ventral scutes 17-20+11-15. Dorsal 17-19. Anal 17-20. Pelvics below anterior  $\frac{1}{2}$  of dorsal.

China, Corea, and Southern Japan.

Several specimens, 90 to 140 mm. in total length, from Amoy, China, and from Japan.

12. *Harengula nymphaea*.

*Clupea nymphaea*, Richards, Ichthyol. China, p. 304 (1848); Günth. Cat. Fish. vii. p. 428 (1868).

Depth of body  $3\frac{1}{5}$  in the length, length of head 4. Snout

as long as diameter of eye, which is  $3\frac{1}{2}$  in the length of head; maxillary extending to below anterior  $\frac{1}{4}$  of eye. 70 gill-rakers on lower part of anterior arch. About 40 scales in a longitudinal and 13 in a transverse series; ventral scutes 18+11. Dorsal 17. Anal 20. Pelvics 8-rayed, a little in advance of middle of dorsal.

China.

Here described from the type, 120 mm, in total length.

LILE, Jordan & Evermann, 1896.

Bull. U.S. Nat. Mus. xlvii. p. 429.

This genus is close to *Harengula*, but is distinguished by the well-defined bluish-silvery lateral band and by the absence of scales on the lobes of the caudal fin. The dermal fold on the edge of the cleithrum described in *Sardinella*, which is developed to a greater or less extent in *Harengula*, is absent in this genus.

Three species from America.

#### 1. *Lile stolifera*.

*Clupea stolifera*, Jord. & Gilbert, Proc. U.S. Nat. Mus. 1881, p. 339.

*Sardinella stolifera*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 431, and 1900, fig. 191.

Depth of body  $3\frac{1}{2}$  to 4 in the length, length of head  $4\frac{1}{4}$  to  $4\frac{3}{4}$ . Diameter of eye 3 in length of head; maxillary extending to below anterior  $\frac{1}{4}$  of eye. 36 gill-rakers on lower part of anterior arch. About 40 scales in a longitudinal, 10 or 11 in a transverse series; ventral scutes 16-18+10-12. Dorsal 15-17; origin nearer to end of snout than to base of caudal. Anal 16-19. Pelvics 8-rayed, below anterior rays of dorsal. A silvery lateral band; ends of caudal lobes blackish. Vertebrae 40 (42).

Pacific coast of Mexico.

Eight specimens, 90 to 100 mm. long.

#### 2. *Lile piquitinga*.

*Sardinella piquitinga*, Schreiner & Ribeiro, Arch. Mus. Rio Janeiro, xii. 1903, p. 72.

Depth of body about  $3\frac{1}{2}$  in the length, length of head  $3\frac{3}{4}$  to 4. Diameter of eye  $2\frac{3}{4}$  in length of head; maxillary extending to below anterior  $\frac{1}{4}$  of eye. 33 gill-rakers on lower part of anterior arch. About 40 scales in a longitudinal and 10 in a transverse series; ventral scutes 16-17+10-11.

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Dorsal 15-18; origin nearer end of snout than base of caudal. Anal 17-19. Pelvics 8-rayed, below anterior part of dorsal. A silvery lateral band. Vertebrae 40.

Coast of Brazil.

Three specimens, 80-90 mm. long, from Pernambuco.

### 3. *Lile platana*, sp. n.

Depth of body 3 in the length, length of head 4. Diameter of eye 3 in length of head; maxillary extending to below anterior  $\frac{1}{4}$  of eye; 23 gill-rakers on lower part of anterior arch. About 40 scales in a longitudinal series; ventral scutes 18+10. Dorsal 14; origin equidistant from end of snout and base of caudal. Anal 18. Pelvics below origin of dorsal. A silvery lateral band.

La Plata.

A single specimen of 45 mm.

## HERINGIA.

*Heringia*, Fowler, Proc. Acad. Philadelphia, lxiii. 1911, p. 207.

*Rhinosardinia*, Eigenmann, Mem. Carnegie Mus. v. 1912, p. 445.

Form moderately elongate, strongly compressed; abdomen sharp-edged. Mouth small, toothless; lower jaw rather prominent, upper without distinct notch; maxillary with a retrorse spine near its proximal end; 2 supramaxillaries. Operculum smooth; suboperculum rounded. Dorsal median, of 13 to 15 rays, without scaly sheath; anal of 15 to 17 rays, with a low scaly sheath; caudal forked, scaly at base, without alar scales. Pelvics 8-rayed, a little in advance of dorsal. 38 to 40 scales in a longitudinal, 9 or 10 in a transverse series; each scale crossed by a transverse groove, from which 2 (fewer anteriorly, more posteriorly) run backwards to the free edge, which is entire. Vertebrae 39.

### 1. *Heringia amazonica*.

*Chupea amazonica*, Steind. Sitzungsab. Akad. Wien, lxxx. pt. 1, 1880, p. 183.

*Rhinosardinia serrata*, Eigenm. Mem. Carnegie Mus. v. 1912, p. 445, pl. lxii. figs. 3, 4.

Depth 3 to  $2\frac{1}{2}$  in length, length of head  $4\frac{1}{4}$  to 5. Diameter of eye 3 to  $3\frac{1}{4}$  in length of head; maxillary extending to below anterior margin or anterior  $\frac{1}{4}$  of eye. 35 gill-rakers on lower part of anterior arch. 38 to 40 scales in a longitudinal, 9 or 10 in a transverse series; ventral scutes keeled

and pointed, 16-17+10-11. Dorsal 13-15; origin nearer end of snout than base of caudal. Anal 15-17. Pelvics a little in advance of dorsal. Silvery; back bluish.

Amazon; rivers of Guiana.

Four specimens, 60 mm. long, co-types of *R. serrata*, from British Guiana.

## 2. *Heringia bahiensis*.

*Pellonula bahiensis*, Steind. Sitzungsab. Akad. Wien, lxxx. 1880, p. 181, pl. iii. fig. 2.

*Sardinella pernambucana*, Schreiner & Ribeiro, Arch. Mus. Rio Janeiro, xii. 1903, p. 72.

Maxillary extending to below anterior  $\frac{1}{3}$  of eye. 42 to 44 scales in a longitudinal series. Dorsal 16-17. Anal 16-18. A more or less distinct bluish-silvery lateral band.

Coast of Brazil.

This species seems to be scarcely distinct from the preceding, examples of which also show a faint lateral band in certain lights.

## XXXV.—On new Weevils of the Genus *Mecysmoderes* from India. By GUY A. K. MARSHALL, D.Sc.

### Subfamily CETHORRHYNCHINÆ.

#### *Mecysmoderes memecylonis*, sp. n.\*

♂. Colour black; the head with moderately dense setiform scales, those in the middle being brown and the others white; the pronotum sparsely set with inconspicuous dark setæ, and with a longitudinal patch of transverse white setæ on the anterior half on each side; the elytra with a longitudinal stripe on the first interval bordering the thoracic spine and composed of small, ovate, overlapping, yellowish-white scales (the basal half of the stripe usually brownish), being continued behind the spine as a double row of elongate brown scales, partly replaced by white ones near the apex; the remaining intervals each bear a single row of similar brown scales, with a few white ones here and there, except along the immediate base, where all the scales are white; the

\* The types of all the species described here are in the British Museum.

lower surface fairly closely covered with separated white scales throughout.

*Head* minutely shagreened, with an indistinct network of raised lines and a strong longitudinal carina on the vertex; the forehead only slightly depressed below the level of the eyes and with a faint central carina. *Rostrum* moderately stout, very slightly widened from the middle to the apex; the basal half shagreened, with a well-marked central carina and another on each side of it, the apical half shining in the middle and with several rows of very shallow punctures at the sides. *Antennae* with the scape sharply pointed at the apex; the funicle with joint 1 about as long as 2 and twice as thick, 3 a trifle longer than 2, 4 shorter than 2, and 5 and 6 shorter still and bead-like, 5 as long as broad, 6 transverse. *Prothorax* very strongly and regularly convex transversely, the sides about equal to half the basal margin, almost straight and with a moderate apical constriction, the front margin produced into a sharp obtuse angle in the middle, the basal spine very long (more than one-third the length of the elytra), the basal margin forming on each side an angle of about  $75^\circ$  with the main axis; the upper surface finely shagreened and dull, with a strong complete central carina and a large-meshed reticulation of fine raised lines, without any conspicuous depressions; the dorsal outline moderately curved, sloping gradually from the base to one-third, and thence much more steeply. *Elytra* about as long as their united width at the shoulders and very broadly rounded behind, the humeral slope forming an angle of about  $45^\circ$  with the suture; the striae broad, shining, and deeply punctate, the intervals rather narrower, carinate and minutely granulate; the dorsal outline convex, deepest before the middle, sloping gradually to the base and more steeply behind. *Legs* black, clothed with separated setiform white scales, the tarsi piceous; all the femora with a sharp tooth, the dorsal apical fringe of the hind tibia longer than the first tarsal joint, the claws unusually small. *Sternum*: the space between the front coxae as broad as the rostrum; the meso- and metasternum broadly excavated, the end of the furrow sloping gradually up to the base of the metasternum, and the mesosternum being almost horizontal.

Length  $1\frac{2}{3}$ – $1\frac{4}{5}$ , breadth  $1\frac{1}{5}$ – $1\frac{1}{3}$  mm.

MYSOKE: Madhavagiri, on leaves of *Memecylon umbellatum* (H. Mann, Pusa Coll.). ASSAM: Sylhet (type).

Allied to *M. nigrorufa*, Mots., but, apart from its red-brown colouring, distinctly narrower form, and unarmed femora, that species has the prothorax much more finely

reticulate, its dorsal outline being almost flat, the front margin rounded, and the central carina flattened; the elytra bear a single row of white scales on the first interval behind the thoracic spine, and the other intervals are set with irregular minute dark setæ; and the metasternum is only shallowly excavated in front. The sternal furrow of *M. me-meylanis* is very similar to that of *M. carinata*, Fst., but in the latter the margins of the apex are overhanging.

*Mecysmoderes verrucosa*, sp. n.

♂. Black or brownish black, shining and sparsely set with very short recumbent white setæ; the elytra with an elongate patch of brown scales along each side of the thoracic spine; the tarsi testaceous.

*Head* unevenly reticulate, with a well-marked central carina running from the vertex to the edge of the interocular depression. *Rostrum* stout, about as long as the front femur, gradually widening from base to apex, somewhat compressed, the greatest depth exceeding the width, the dorsal outline strongly curved, but with a depression at the base and a deep sinuation in the middle; the upper surface rugosely punctate, with a strong central carina (obsolete in the median depression and ceasing a little behind the insertion of the antennæ) and two finer irregular ones on each side. *Antennæ* with the apex of the scape not produced into a sharp point; the funicle with the two basal joints equal in length, 3 rather shorter, 4 again much shorter, 5 and 6 bead-like. *Prothorax* with the sides about as long as half the basal margin, slightly rounded in the posterior half, abruptly narrowed in front, the apical constriction being broad and collar-like, the front margin rounded dorsally and slightly produced in the middle; the whole of the central portion of the disk is raised into a large boss-like prominence, the top of which bears an elevation on each side, the space between them being longitudinally flattened; the upper surface is coarsely reticulate, with a sharp central carina running from the apical edge to the tip of the basal spine, and on each side of it on the apical collar is another sharp carina—these being convergent behind in the type and parallel in a second specimen. *Elytra* about as long as their width at the shoulders, which are very prominent and rounded, the humeral slope forming an angle of about 70° with the main axis; the striae broad and shallow, rather sinuous, much more irregular than usual, and containing very unequal punctures, the intervals very uneven, bearing elongate tubercles and set with scattered minute

granules; the more conspicuous tubercles are situated as follows:—interval 2 with a small one at the top of the declivity, on interval 3 a small one near the base and a very large one near the middle, on interval 5 a large one near the base and a small one close behind it, on interval 7 a medium one near the shoulder and another about the middle, on interval 9 a large one about the middle, and a large one just behind the shoulder on interval 10; near the apex a transverse row of tubercles on intervals 3–7, those on 5 and 6 being elongate and the others short; behind these is a broad transverse impression. *Legs* rather long, with scattered recumbent short white setæ; the femora rugosely punctured, armed with a stout tooth, and transversely impressed externally near the apex; the tibiae rather slender, scarcely dilated at the apex and there clothed externally with golden-brown hairs, which form a dorsal fringe hardly as long as the first tarsal joint. *Sternum*: the mesosternum sloping very steeply and very shallowly impressed in the middle to receive the apex of the rostrum, the metasternum not excavated, and the space between the front coxæ as wide as the rostrum.

Length  $2\frac{1}{2}$ –3 $\frac{1}{2}$ , breadth  $2$ – $2\frac{1}{2}$  mm.

ASSAM: Patkai Hills (*W. Doherty*).

A strikingly distinct species.

*Mecysmoderes metasternalis*, sp. n.

♂. Colour varying from black to red-brown, variegated with brown, yellowish and white scales or setæ; the head with fairly dense narrow white scales; the prothorax with the entire sides and lower surface bearing close whitish scales and setæ, a triangular patch of white setæ on the apical third of the median area (its base on the front margin), and some pale setæ on each side of the basal third of the central carina, thus leaving a broad, roughly X-shaped, bare discal patch; the elytra with a very long raised stripe of scales on each side of the thoracic spine extending for more than half their length, the basal two-thirds being very dark brown, the apical third whitish; these scales are very closely packed and obliquely raised or almost erect; a large lanceolate sub-humeral patch of dense whitish scales (continuous with similar scaling on the whole lower surface), the inner edge of which reaches the sixth stria at the base and extends obliquely backwards to nearly the middle of the lateral margin; the apical margin and the posterior half of the lateral margin with an irregular edging of white scales, and a row of yellowish scales on the basal fourth of the second interval;

the rest of the elytra clothed with dark brown scales variegated with narrower light brown and white scales, and with a conspicuous spot of broader white scales before the middle on the eighth interval.

*Head* with the inner edge of the eyes strongly raised above the general level; the forehead very narrow, not broader than the antennal club, and broadly impressed behind; the vertex rugosely punctured, with a well-marked central carina and densely clothed with elongate pale scales. *Rostrum* piceous black, with the extreme apex reddish; long, slender, and cylindrical, extending beyond the middle of the metasternum; rather dull and very finely aciculate, with two short indistinct furrows on each side at the base, and no central carina; the punctures indistinct at the base, shallow and widely separated for most of the length, and deeper near the apex. *Antennæ* testaceous; the scape without any apical process; the three basal joints of the funicle subequal in length, joints 4 and 5 a little longer than broad, 6 almost globular. *Prothorax* with the basal spine very long, about as long as the prothorax, and extending along nearly two-thirds of the elytral suture; the sides (viewed vertically) almost straight and shorter than half the basal margin; the front margin somewhat produced dorsally, the produced portion elevated and truncate in the middle, so that when seen from in front it appears as a flattened triangle; the upper surface covered with large irregular reticulate punctures, the median area raised and strongly compressed in the anterior half, being bounded by a sharp carina on each side to about the middle, the central carina well-marked throughout; the dorsal outline distinctly convex and deepest about the middle; the scales on the sides of the prothorax are mostly setiform, but there is a patch of much broader scales just below the outer carina and another patch some distance below that. *Elytra* about as long as broad; the striae broad and deep, with large punctures and without rows of scales, except in the first stria; the intervals somewhat broader than the striae and irregularly granulate; the scales on the greater part of the surface are small, narrow, parallel-sided, and truncate at the tip, but those in the raised patch along the suture, in the basal stripe on interval 2, the subhumeral patch, and the white border are broader and elliptical in shape. *Legs* piceous, the tarsi paler; the femora densely clothed with broad pale scales and all with a strong tooth; the dorsal apical fringe of the posterior tibiae much longer than the first tarsal joint. *Sternum* with the front coxae widely separated; the mesosternum almost horizontal and broadly and shallowly impressed; the metasternum with



a broad and deep furrow throughout, which is quite open at the posterior margin.

Length  $2\frac{1}{2}$ , breadth 2 mm.

BURMA: Tavoy, Tenasscrim (*W. Doherty*).

The most striking features of this species are the structure of the front margin of the pronotum, the very long prothoracic spine, the elevated sutural scales on the elytra, and the open continuous furrow on the metasternum.

*Mecysmoderes subhumeralis*, sp. n.

♂. Colour varying from piceous black to red-brown, the upper surface sparsely clothed with yellowish hair-like scales; the sutural patch of scales on the elytra extending for about one-third of their length, the basal two-thirds of the patch being black and the apical third whitish; on the seventh interval of the elytra there is a small spot of white scales before the middle; the lower surface sparsely clothed with pale scales, except for a dense patch on the upper half of the mesosternal epimeron.

*Head* reticulate, the central carina continued well on to the forehead, which is almost as broad as the base of the rostrum and strongly impressed. *Rostrum* short and very stout, hardly longer than the front femur and only just reaching the metasternum, parallel-sided in the basal two-thirds, slightly wider at the apex, its dorsal outline strongly convex, and its depth greater than its width in the middle; the upper surface with indistinct confluent punctation, a strong central carina for three-fourths its length, and a less distinct lateral one. *Antennæ* testaceous; the scape without an apical process; the funicle with joints 1 and 2 subequal, 3 distinctly shorter, 4 longer than broad, 5 and 6 subglobular. *Prothorax* with the sides equal to half the basal margin, straight from the base to beyond the middle and then rather abruptly constricted; the basal margin more nearly transverse than in most species, the spine short, about one-fourth the length of the suture; the front edge truncate dorsally and narrowly marginate; the whole discal area forming a rounded elevation laterally compressed in the anterior half, irregularly and unequally reticulate, with a strong and complete central carina, on each side of it in the front half a short carina that does not reach the margin, and beyond this another irregular sinuate one that does reach the margin. *Elytra* about as long as their greatest width, the striae broad and deep, with separated punctures and each with a single row of distant minute white setæ; the intervals costate and scarcely broader

than the striae, each with a row of small granules bearing short recumbent setae and some scattered yellowish hair-like scales (especially in the basal half). *Legs* piceous, with the tarsi paler; the femora rugosely subgranulate, with sparse whitish hair-like scales and each with a small tooth; the dorsal apical fringe of the hind tibia not longer than the first tarsal joint. *Sternum* with the front coxae widely separated, but not enough to receive the whole rostrum; the mesosternum not impressed and sloping steeply; the metasternum simple.

Length  $2\frac{3}{4}$ , breadth  $1\frac{3}{4}$  mm.

ASSAM: Patkai Hills (W. Doherty, type); Sudiya (Doherty).

Very similar superficially to *M. memecylonis*, sp. n., but differing markedly in the structure of the sternum, non-angulate front margin of the prothorax, short thoracic spine, short third funicular joint, setigerous elytral striae, etc.

*Mecysmoderes pusio*, sp. n.

♂ ♀. Colour piceous, with greyish-white scaling, the rostrum and tarsi often paler; the scales on the head are narrow and fairly dense; on the pronotum they are more hair-like and sparser on the disk, being shorter and denser at the sides and margins and in the central furrow; on the elytra there is a short stripe of almost circular small scales on the basal fourth of the first interval, the remaining intervals each bearing a single regular row of very narrow and short scales, except on intervals 9 and 10, at the bases of 3 and 5, and on the humeral callus, where the scales are duplicated or more numerous; on the lower surface the scales are larger, oval, and fairly close, but usually not quite contiguous.

*Head* shagreened and shallowly reticulate, with an indistinct central carina on the vertex only, the forehead shallowly impressed and broader than the club of the antenna. *Rostrum* long, slender, and cylindrical, not quite reaching the hind margin of the metasternum (♂) or extending slightly beyond it (♀); very faintly tricarinate in the basal part, the more shining apical area with indistinct shallow separated punctures. *Antennae* testaceous, the scape with a short apical pointed process, the funicle with the two basal joints subequal, the third slightly longer. *Prothorax* with the sides about as long as half the basal margin, scarcely rounded and very shallowly constricted at the apex; the basal margin nearly transverse externally, the central spine short, only about one-eighth the length of the suture, the

apical margin truncate dorsally; the upper surface moderately convex, with well-marked carinate reticulations, except on the apical collar, a broad shallow central furrow from the collar to beyond the middle, containing a deep rounded fovea in front and changing near the base into a low carina that runs on to the spine. *Elytra* about as long as their greatest breadth, the striae very broad, with deep separated punctures and quite bare, the intervals subcarinate, each with a row of spaced setigerous granules. *Legs* piceous, with the tarsi paler, clothed with separate, long, narrow, pale scales; the femora with a minute tooth, which is situated much lower down than usual, being about in the middle of the limb and partly concealed by scales; the dorsal apical fringe of the hind tibiae hardly as long as the first tarsal joint. *Sternum* with the front coxæ widely separated for the reception of the rostrum; the mesosternum broadly and deeply excavated, almost horizontal in the middle; the metasternum with a broad central furrow throughout, which is not enclosed behind.

Length  $1\frac{3}{4}$ , breadth  $1\frac{1}{10}$  mm.

BURMA: Tavoy, Tenasserim (W. Doherty).

Very similar to *M. carinatus*, Fst., in which the thorax is of quite the same type and the sculpturing of the elytra is similar; but that species differs markedly in its metasternum, which has a deep overhanging excavation in its anterior part only, the femora have no tooth, there is no carina on the head, etc.

*Mecysmoderes pectinipes*, sp. n.

Colour black, variegated with grey and brown setae and scales; the prothorax clothed above with recumbent setae only, the brown ones being more numerous on the disk; the elytra with a sutural stripe of dense whitish scales extending for more than one-third of the suture, the remaining intervals bearing linear scales (not less than two, and more often three deep), which are grey at the base and mostly dark brown elsewhere, variegated here and there with grey scales; the lower surface rather densely clothed with broad whitish scales. Immature specimens are sometimes testaceous, with the thoracic carina and spine black; and various intergrades occur between this and the black mature form.

*Head* with coarse close confluent punctation, the central carina indistinct or absent, the forehead not at all impressed. *Rostrum* black, with the apex reddish; as long as the front

femur (♂) or a little longer (♀), cylindrical, slightly tapering to the apex from the insertion of the antennæ; the upper surface without any distinct carinæ, but closely and confluent punctate from the base to the antennæ, beyond which the punctures are finer and isolated, especially in the ♀. *Antennæ* testaceous; the scape without any apical process; the funicle with joints 1 and 2 subequal, 3 shorter, 4-6 bead-like. *Prothorax* with the sides gently rounded and each about as long as half the basal margin, the apical constriction slight; the basal spine nearly one-third the length of the suture, the apical dorsal margin feebly angulate in the middle; the upper surface is regularly and gently convex, without elevations or depressions, evenly set with longitudinally confluent punctures, with a low, broad, complete central carina and a fine, short, apical one at some distance on each side of it; the dorsal outline almost flat, deepest near the base, and sloping forwards. *Elytra* as long as their greatest width, the striæ broad and deep, and containing single rows of narrow scales; the intervals evidently broader than the striæ, flat, and closely and strongly punctate. *Legs* black, with the tarsi red-brown, rather thinly clothed with narrow pale scales; the femora with a stout tooth; all the tibiae strongly dilated at the apex, which bears a double row of stout testaceous spines instead of the usual bristles. *Sternum* with the front coxæ so narrowly separated that the rostrum cannot lie between them; the mesosternum almost vertical and not impressed; the metasternum simple.

Length  $2\frac{2}{3}$ - $3\frac{1}{2}$ , breadth  $1\frac{2}{3}$ -2 mm.

MADRAS: Nilgiri Hills (*H. L. Andrewes*).

A very distinct species on account of its dilated and pectinate tibiae, closely approximated front coxæ, and unimpressed forehead.

*Mecysmoderes tenuirostris*, sp. n.

♀. Colour reddish brown above, with the head, the thoracic carina and spine, and the basal margin of the elytra blackish; the head and pronotum with rather sparse yellowish setæ, the latter with a small patch of ovate whitish scales on each side before the middle just below the outer carina; the elytra with the sutural stripe of ovate scales extending over nearly half the suture, the scales being blackish except for a short distance at the apex, where they are whitish; a few ovate whitish scales at the base of interval 2 and near the apex of the suture, the rest of the intervals being clothed

(usually about three deep) with intermingled yellowish and blackish narrow setiform scales; the lower surface blackish (except the prosternum, which is reddish) and densely clothed with broad ovate whitish scales except on the mesepimeron, the lateral lobe of the mesosternum, and the front half of the metepisternum, where the scales are markedly narrower and have a brownish tinge.

*Head* coarsely and confluent punctate, with a carina on the vertex; the forehead strongly depressed, very broad behind, and narrowing in front to the width of the rostrum. *Rostrum* extremely long and slender, cylindrical and moderately curved, reaching to the hind margin of the first ventral segment; a smooth central line on the basal third and rows of punctures on each side of it, the apical area smooth and impunctate. *Antennae* testaceous brown, inserted behind the middle of the rostrum; the scape without any apical process; the funicle with joints 1 and 3 subequal, 2 markedly longer, 4 much longer than broad, 5 and 6 globular. *Prothorax* with the sides as long as half the basal margin, gently rounded and rather broadly constricted at the apex, the apical margin being truncate (as seen from above), but raised in the middle so as to form a vertical angle; the basal margin rather less oblique on each side than usual, the spine very long and slender, extending nearly for one-half the suture; the upper surface not very convex, coarsely and subreticulately punctate, with a well-marked and complete central carina, and a prominent carina on each side of it in the anterior half, below which the sides are compressed. *Elytra* as long as their greatest width, the striae deep but not broad, each containing a row of spaced yellowish scales; the intervals evidently broader than the striae, flat, and coarsely punctate. *Legs* rather long and slender, clothed with separated yellowish setiform scales; the femora with a stout tooth; the dorsal apical fringe of the hind tibiae not longer than the first tarsal joint. *Sternum* with the front coxae moderately widely separated; the mesosternum quite flat and almost vertical; the metasternum simple.

Length  $2\frac{2}{3}$ – $2\frac{3}{4}$ , breadth  $1\frac{1}{2}$ –2 mm.

MADRAS: Nilgiri Hills (*H. L. Andrewes*).

Differs from all the Indian species known to me by its very long and slender rostrum; the unusual length of the second joint of the funicle is also noteworthy.

XXXVI.—Occurrence of a *Holothurian* new to the Fauna of Bermuda. By W. J. CROZIER.

(Contributions from the Bermuda Biological Station for Research.—No. 61.)

THE West-Indian affinities of the Bermudan fauna and flora (Britton, 1912, p. 193) have been evident to every student of these regions; yet, as Pilsbry (1900, p. 494) remarks in considering the Pulmonates, there is "abundant evidence of what we call chance, or the rigorous selective action of an over-sea journey, in the Bermudan assemblage." Continued collecting is disclosing further additions to the marine population in the shape of species identical with well-known West-Indian forms\*. In one such case, which is the subject of this note, it seems to me that the addition may legitimately be considered as of recent date.

The pelagic *Holothurians* of Bermuda waters have been collected ever since 1883 by Heilprin, Verrill, Clark (1901), and others. Each of the five species previously reported (*Cucumaria punctata*, *Stichopus möbi*, *Holothuria surinamensis*, *H. captiva*, and *H. rathbuni*) is well represented in the West-Indian area. Certain conspicuous Antillean types have, however, been lacking in the Bermudan collections; *Actinopyga* and several species of *Holothuria* are in this category †.

I have had occasion to examine with care several thousand specimens of *Stichopus möbi*, Semp.—with which, on superficial examination, *Actinopyga* might conceivably be confused,—and have, indeed, given particular attention to *Holothurians* collected at many points in Bermuda. No unusual specimens were observed until July 3, 1916, when there was secured from a depth of about 6 feet beneath low water, in the channel entrance to Hungry Bay (on the exposed south

\* Among the Enteropneusta, for example, of which an illustrated account is in course of preparation, at least two of the four or more species which I have found occur also in the Bahamas and at Jamaica, as well (probably) as at other stations in the West Indies.

† Of the five apodous species found here (Clark, 1907), only two (*Chirodota ratifera* and *Synaptula hydriformis*) are typically West-Indian, while two others (*Leptosynapta inhaerens* and *L. roseola*) are northern forms; the remaining one (*L. acanthix*) appears to be peculiar to the Bermudas.

shore), an individual which was at once seen to be peculiar. The *Holothurian* was about 25 cm. in length, and of a deep yellowish-brown colour, unmarked by spots of any other hue. Anal teeth were particularly prominent, and the pedicels and ventral surface were tinged with greenish pigment, such as one is accustomed to see in *Holothuria captiva* and in *H. surinamensis* (Crozier, 1915, p. 274). *Stichopus* has no anal teeth, and totally lacks this green pigment. The specimen was unfortunately lost before detailed examination could be given it. Attempts to discover an additional example have thus far been fruitless.

The single specimen observed has, however, considerable zoö-geographical interest. It seems probable, from the external characters above mentioned, that it is an *Actinopqa*, presumably *A. agassizii* (Selenka)\*, which is known from the Bahamas, Florida, Tortugas, Barbados, Jamaica, and Hayti (Sluiter, 1910). The inference seems fair that it represents a recent arrival in Bermudan waters, since previous extensive and detailed collecting has failed to reveal its presence, and since only a single specimen has been found. Concerning the method whereby, on this assumption, it came to Bermuda, one can only speculate. It may have been transported either (as a larva) by ocean currents or (as an adult) upon the bottom of a vessel. The latter seems the less probable.

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\* I am indebted to Dr. H. L. Clark for a suggestion regarding the probable identity of the specimen.

XXXVII.—*Descriptions of a new Lizard and Two new Frogs discovered in West Africa by Dr. H. G. F. Spurrell.* By G. A. BOULENGER, F.R.S.

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*Lygosoma spurrelli.*

Section *Emoa*. Habit lacertiform; the distance between the end of the snout and the fore limb is contained once and two-fifths in the distance between axilla and groin. Snout short, obtuse. Lower eyelid with an undivided transparent disk. Supranasals very small; frontonasal broader than long, forming a very broad suture with the rostral and narrowly in contact with the frontal, which is as long as the frontoparietals; frontoparietals and interparietal distinct, latter smaller; four supraoculars; seven superciliaries; sixth upper labial largest and below the eye. Ear-opening moderately large, vertically oval, without lobules anteriorly. 30 smooth scales round the middle of the body, ventrals largest. Marginal præanals not enlarged. The hind limb does not reach the axilla. Digits rather short, feebly compressed; subdigital lamellæ obtusely keeled, 13 under the fourth toe. Tail once and a half the length of head and body, gradually tapering from the base. Dark reddish brown above, nape, back, and limbs with numerous small black and yellow spots; a blackish lateral streak from the nostril, through the eye, to the base of the tail; sides pale brown, without spots; lower parts yellowish white.

	mm.
From snout to vent.....	48
"    "    fore limb.....	17
Head.....	10
Width of head.....	8
Fore limb.....	13
Hind limb.....	18
Foot.....	8
Tail.....	74

A single specimen from Obuasi, S. Ashantee.

Closely allied to *L. breviceps*, Peters\*, but with fewer scales round the body.

*Rana leonensis.*

Vomerine teeth in very short oblique series close to the anterior corners of the choanæ. Head much longer than

\* Cf. Boulenger, Ann. Mus. Genova, (3) ii. 1906, p. 206.



Family **Hesperiidæ.***Hasora philetas.*

*Ismene philetas*, Plötz, Stett. ent. Zeit. xlv. p. 55 (1884), unpublished plate no. 1159.

*Hasora simplicissima*, Swinhoe (part.), Trans. Ent. Soc. 1903, p. 34.

*Hasora mixta*, Fruhstorfer (part.), Iris, 1911, p. 68.

*Hab.* Philippines.

Fruhstorfer puts *philetas* as a synonym to *mixta*, Mab., but *mixta* like *simplicissima* is a Parata, whereas *philetas* (which Semoer wrongly identified in Rhop. Phil.) is a *Hasora*, with the stigma on the fore wing, though the markings are very similar; I have *philetas* male from the Philippines which exactly corresponds with Plötz's figure.

*Notocrypta tobricitula*, nov.

♂ ♀. Somewhat similar to *N. aluensis*, Swinhoe, Ann. & Mag. N. H. (7) xx. p. 431 (1907), from the Solomon Islands, figured in Trans. Ent. Soc. 1908, pl. iii. fig. 11, and *N. wolana*, Plötz (from Arn Isl.), Berl. ent. Zeit. xxix. p. 225 (1885), a copy of Plötz's figure given in the same plate (fig. 9), but in neither sex are there any dots or any other markings above or below, there being only the discal white band of the fore wing which is very much narrower than in either of the above-named species, is much more curved, narrows hindwards in the male into a square spot, is similar in the female, but is of the same width throughout.

Expanse of wings, ♂  $1\frac{1}{10}$ , ♀  $1\frac{5}{10}$  inch.

*Hab.* Kiriwini Isl., Tobriand group.

*Ection elio-churnus.*

*Hesperia churnus*, Plötz, Berl. ent. Zeit. xxix. p. 226 (1885), unpublished plate no. 1373.

*Ection elio-ayakara*, Fruhstorfer, Iris, 1911, p. 19.

*Hab.* Malacca, Perak.

A somewhat variable form, though the type form *elio*, Hew., from Sumatra, is fairly constant.

*Telicota bambusa kiriwinia*, nov.

♂. Resembles *T. pythias*, Mabille, Pet. Nouv. ii. p. 374 (1878), from Java, Sumatra, and Nias; the markings are very similar, but the colour is paler; the fore wing is longer and the hind wing produced hindwards.

♀. Very different from the females of *pythias*. Upper-side: fore wing nearly all black; an orange streak on the basal half of the costa; a small streak below its outer end; a streak on the median vein from near the base to the origin

of vein 2; a longer streak on the internal vein and a shorter streak from near the base close along the hinder margin of the wing; two orange spots in the disc, and two small spots subapical: hind wing also nearly all black; a streak of orange hairs in the cell, one along the internal vein, and a discal narrow band of four orange spots. Underside: both wings black, marks orange: fore wing with a broad streak close to the costa; from the base to beyond the cell-end, joined to a spot at the upper end of the cell, three discal spots, the upper one pushed outwards; a small dot again outwards, and three subapical: hind wing with a spot at the end of the cell and a discal band as on the upperside; antennae longer than usual in the group.

Expanse of wings, ♂  $1\frac{1}{2}$ , ♀  $1\frac{1}{10}$  inch.

Hab. Kiriwini Isl., Tobriand group.

### Family Deilemeridæ.

#### Section I.

Veins 6 and 7 of hind wing not stalked, palpi short.

#### *Deilemera paradelpha*, nov.

♂ ♀. Belongs to the *peller* group: Section I, of my "Monograph of the *Deilemeridæ*"\*. Frons white; head and collar luteous; thorax white; a black spot on the head, two on the collar, and the thorax with three black spots down the middle and three on each side; palpi luteous, last joint black; abdomen dull greyish yellow, with pale brown segmental bands: fore wing pale black, with a lilac tinge; spots white, a small round spot in the middle of the cell in the male, developed into a short streak in the female; a large oval spot across the end of the cell, from vein 11 to vein 2; large submarginal spots as in *peller*; a white streak on the hinder margin from base to a little beyond the middle: hind wing white; a pale black uniform marginal band, running narrowly up the abdominal margin for a short distance, and containing a white subapical spot and a medial spot. Underside: wings as on the upperside; legs ochreous; body white, without markings.

Expanse of wings, ♂ ♀,  $1\frac{1}{10}$  inch.

Hab. Fergusson Isl.

#### *Deilemera bouruana*, nov.

♀. Allied to *D. separata*, Walker, xxxi. p. 204 (1864), from Gilolo Island. Pectus white; palpi white, last joint black; frons, head, and thorax white, collar tinged with

\* Trans. Ent. Soc. 1903, pp. 53-81.

ochreous; frons with a black spot, a large one on the head, running in between the antennæ, two on each side of the collar; a black streak down the middle of the thorax and one on each side; abdomen ochreous grey, with black macular segmental bands, marked with white: fore wing black, markings white; a thick streak in the cell, from the base to its middle, another similar but thicker streak immediately below it and extending a little beyond it; a streak on the hinder margin, from the base to beyond the middle; a large, oval, discal, oblique spot from close to the costa, where it is round and small to vein 2, nearer the hinder angle of the wing than is usual in the *pelleus* group, in one specimen it runs below vein 2 and is attenuated; three larger submarginal spots. Underside: wings as above; body white with thin segmental bands on the abdomen; legs white striped with black.

Expanse of wings  $1\frac{6}{10}$  inch.

*Hab.* Bonru Isl., South Moluccas.

*Deilemera externa*, nov.

♂ ♀. Face white; palpi black; frons, head, and thorax ochreous; a black spot on the frons, a large one on top of head, covering nearly the whole space and running in between the antennæ, two on the collar, an angular spot behind them followed by an oval black spot on each shoulder; abdomen greyish ochreous, some white specks at the base and thin darker segmental lines touched with white at the sides and a row of black spots on each side: fore wing dark black, markings white; a disjointed thin streak from the base to the middle of the cell; a small spot below it and a little outside; an oval spot in the disc from vein 11 to a little below vein 2, narrow in the type-specimen, broader in others; three submarginal spots, the two lower ones connected together in the type-specimen; a white streak on the hinder margin: hind wing with a rather broad and even marginal black band running thinly up the abdominal margin to the base, and narrowly along the costa, with a knob at its middle; two white spots in the band, and indications of a third spot as in *Aurivillius's* figure of *pelleus*\*, but not so distinct. Underside: wings as above; legs and thorax ochreous abdomen white with black segmental bands.

Expanse of wings, ♂  $1\frac{6}{10}$ , ♀  $1\frac{7}{10}$  inch.

*Hab.* Batjan Isl., Middle Moluccas.

†  
Section I. B.

Antennæ shortly pectinated.

*Deilemera gonora*, nov.

♂. Nearest to *D. oroya*, Swinhoe, from Sula Besi. Palpi white, last joint black; frons, head, and thorax white; frons with a black spot, collar with two; two square black spots followed by a round one on the thorax; abdomen white with hardly any markings, tip ochreous; wings white, markings black: fore wing with the veins black; a small patch on the middle of the costa, another on the costa above the cell-end and running into the bar at the end of the cell; a broad black band on the outer margin containing three white sub-apical spots close together, the middle one the largest, the lower very small, followed by two spots against the black patch above the cell-end, with two white linear marks below them, and large white spot at the middle of the outer margin with a white streak attached to its lower end; hind wing with a fairly broad black outer marginal band, not continued on the costa, its inner margin sinuous and two white spots in it, apical and medial. Underside: wings as above; body white without markings; legs ochreous.

Expanse of wings 2 inches.

Hab. Stephenson, Dutch New Guinea.

*Deilemera similis*, nov.

♂ ♀. Nearest to *D. burica*, Holland, from Bouru, of which I have a fine series from Bouru; palpi white, last joint black; frons, head, and thorax pale ochreous, nearly white; frons with a black linear spot, another similar spot on the head; thorax with two black spots on each side; abdomen pure white, with small black dorsal and lateral spots: fore wing black, markings white; a broad spear-shaped streak from the base, from the median vein to the internal vein, containing a black dot at its base, two short sub-costal streaks above it and two round spots outside it; a broad oblique band divided by the veins into five large spots, the lowermost round, the others elongate, the fourth from the costa the largest, and extended both outwards and inwards with a little streak hindwards from its interior end, the third wedged in outwards between the second and the fourth, sometimes with a very small spot attached to its upper side; a little beyond the band is a subcostal spot with another below it; a large double spot subapical and another near the middle of the outer margin: hind wing with a rather broad black band narrowing hindwards, and continued in almost a line on two-thirds of the costa; a white spot on the costa below the

apex, a smaller spot just inside it, and a larger spot near the margin below the middle. Underside: wings as above; body and legs white, tarsi black at the ends.

Expanse of wings, ♂ ♀,  $1\frac{8}{10}$  to 2 inches.

*Hab.* Stephenson, Dutch New Guinea; a fine series.

#### Section II. D.

Veins 6 and 7 of hind wing stalked, palpi longer; male without secondary sexual characters.

#### *Deilemera cenis parva*, nov.

♀. Very similar to *D. cenis*, Cramer, from Sikkim, Silet, and Assam, but very much smaller, all the spots and bands about half the size.

Expanse of wings  $1\frac{6}{10}$  inch.

*Hab.* Au-San, Central Formosa.

Two females.

#### *Deilemera poliodesma*, nov.

♂ ♀. Head, collar, body, and palpi luteous, last joint black; a black spot on the frons, another on the top of the head, two on the collar, a thick black stripe along the middle of the thorax, and a narrower black stripe on each side; abdomen with black segmental bands above, and black spots on the segments beneath: fore wing black; a broad discal white band divided by the veins into six spots, much as in *D. baulus*, Boisd., from Benu, but narrower, the uppermost spot small, the veins of the wing from the base to this band dull yellowish: hind wing pure white, a broad marginal black band, angled inwards on vein 2, narrowing on the costa, and running upwards for a short space on the abdominal margin. Underside much as above, but paler, the inner portion of the fore wing suffused with dull ochreous.

Expanse of wings, ♂ ♀,  $1\frac{7}{10}$  inch.

*Hab.* New Britain (New Mecklenburg).

Belongs to the *baulus* group. I have a great number of examples of this group from the different islands, and, though more or less resembling each other, each island seems to contain a form of its own.

#### *Deilemera homogona*, nov.

♂. Allied to *D. lacticiaria*, Cramer; the abdomen is without the black segmental bands on the upperside, having merely a row of black dots, decreasing in size hindwards; the fore wing has the discal white band twice the width, more compact, and on the upperside of the small outer white spot (the third from the costa) there is another white spot

attached; the marginal black band of the hind wing is much narrower and decreases in width hindwards.

Expanse of wings  $1\frac{7}{10}$  inch.

Hab. Hué, Annam.

*Deilemera perissa*, nov.

♂ ♀. Allied to *D. luctuosa*\*, Vollenhoven, from Batjan Island; palpi, head, and body ochreous, last joint of the palpi black; frons with a black spot in its centre, one on the head, two on the collar; three longitudinal stripes on the throat, a spot at the base of the abdomen followed by segmental black bands: fore wing black, a spear-shaped white band from near the base, widening outwards to the base of vein 2, where it is cut short; a short white streak from the base along the costa, another on the median vein to the base of vein 2, and a similar streak on the internal vein; a fairly broad discal white band of seven white spots joined together, the fourth round and small, between the ends of the third and fifth, the lowest still smaller and oval; in one example, the band from the base is connected with the discal band by a thin white streak and there is a white spot at the end of the cell: hind wing white, with the usual black marginal band, much as in *luctuosa*. Underside as on the upperside; body and legs ochreous, the former spotted with black; the legs with black stripes.

Expanse of wings, ♂ ♀,  $1\frac{1}{2}$  inch.

Hab. Obi Isl., Moluccas.

A fine series.

*Deilemera delocyma*, nov.

♂. The antennæ long, the pectinations also somewhat longer than is usual in the group; pectus, frons, head, and thorax dull orange-ochreous; frons with a black spot, one on the neck, two on the collar; thorax with black stripes on the middle and on the sides; abdomen dull orange-ochreous, with black segmental bands, so broad as almost to obliterate the ochreous colour: fore wing long; costa much arched before the apex; colour black, a white stripe below the median vein from the base to the middle; a broad and somewhat upright discal band divided by the veins into seven spots, extending from near the costa to near the hinder margin, the first three from the costa narrow, the fourth oval, wedged in between the outer halves of the third and fifth, the sixth the largest, the seventh small and round-edged: hind wing white, a broad black marginal border, angled at vein 2, and continued narrowly along the costa. Underside: body

\* Tijl. von Dierk. i. p. 42 (1863).

orange-ochreous; abdomen with black segmental bands; legs orange-ochreous striped with black.

Expanse of wings 2 inches.

*Hab.* Flores Isl.

Family Orthostixidæ.

*Alex niasica*, nov.

♀. Frons and palpi black, the inner side of the first two joints of the palpi white; ground-colour of the head, body, and wings greyish ochreous; head and collar blackish through thickly covered irrorations; both wings uniformly covered with short brown striations; fore wing with a pale brown mark at the upper end of the cell, both wings with indistinct traces of outwardly curved, pale brown, thin bands, antemedial and discal; a thin, marginal, pale brown line and ochreous cilia with grey tips. Underside as above, but the striations and transverse lines thicker and more prominent.

Expanse of wings 2 inches.

*Hab.* Nias.

Quite distinct from any other species of this genus known to me.

Family Geometridæ.

*Pingasa talagi*, nov.

♂. Frons, head, body, and wings greyish white, strongly tinged with ochreous irrorations; palpi with the third joint black, elongate as in *P. arvensis*, Prout\*; wings with the markings pale grey: fore wing with a sinuous blackish thick line closing the cell; a nearly straight short line beyond it from the middle of interspace 3 to near the costa, an indistinct outwardly curved subbasal line; a more distinct and thicker postdiscal line, more or less distinctly macular; a submarginal row of indistinct spots pricked with white on their inner sides, and minute dots on the outer margin; hind wing with a line closing the cell; the two outer marginal bands diffuse and more or less conjoined together and with the outer margin, the white inner marks on the very indistinct submarginal spots more prominent than they are on the fore wing. Underside: wings paler and without irrorations; fore wing with a very large black spot at the end of the cell and a large black upper discal patch attenuated hindwards; three white dots outside the upper part of the black patch; hind wing with a thick black lunular mark at the end of the cell, and a large black upper discal patch as on the fore wing but without the white dots.

Expanse of wings  $1\frac{7}{10}$  inch.

*Hab.* Talagi, a small island off Ysabel Island in the Solomon group (*Ecceroti*).

\* Nov. Zool. xxiii. p. 7 (1916).

XXXIX.—*Notes on Myriapoda*.—V.\* *On Cylandroiulus (Leucoiulus) nitidus (Verhoeff)*. By HILDA K. BRADE, M.Sc., L.R.C.P., M.R.C.S., and the Rev. S. GRAHAM BIRKS, M.Sc.

LAST year Dr. A. Randell Jackson recorded † the finding by one of us ‡ at Winkhill, near Leek, Staffs, of *Cylandroiulus (Leucoiulus) nitidus* (Verhoeff). This seems to have been the first record of the occurrence of this species in Britain, and the following notes are based primarily upon our study of material from the locality named in the light of the original paper § in which Dr. C. W. Verhoeff describes *Julus nitidus*. Of this description we have made the fullest use, and we here express our indebtedness.

Our specimens were first examined by Dr. Jackson, and then sent to Monsieur le Docteur Henry W. Brölemann of Pau, who, with his usual kindness, dissected one of the males, and identified it as the *Julus nitidus* described by Verhoeff.

#### 1. OCCURRENCE AND HABITAT.

*Cylandroiulus nitidus* was taken in September 1915 at Winkhill, Staffs, by one of the writers (H. K. B.); three males and two immature specimens were found together under a stone on the grassy sides of the road leading from the station to the village; no adult females were then taken. In September 1916, when we had already made some study of the limited material then at our disposal, we took many specimens of both sexes in the same immediate neighbourhood. In the field *C. nitidus* resembles *C. silvarum* (Meinert) very closely except in habitat. Verhoeff states (*loc. cit.*) that he had noticed this animal only in woods or on heights. He records it in the Rhine and Moselle districts: at Melbthal, near Bonn, in a wood under leaves; at Ippendorfer Höhe, near Bonn, at the edge of a wood under stones; at Cochem, in woods and at Siebengebirge, Petersberg, in woods under stones. There are some trees in the neighbourhood of the ground where the English specimens were collected at Winkhill; but the very limited area of its occurrence is not in close connection with woods, the district being hilly and

\* The authors' previous notes I.—IV. in this series appeared as follows:—I, *Lancs. & Ches. Nat.*, June 1916; II., *ibid.* July 1916; III., *Irish Naturalist*, August 1916; IV., *Lancs. & Ches. Nat.*, September 1916.

† "On some Arthropods observed in 1915," *Lancs. & Ches. Nat.*, Feb. 1916, p. 391.

‡ H. K. B.

§ "Ein Beitrag zur mitteleuropäischen Diplopoden-Fauna," *Berliner Entomolog. Zeitschrift*, xxxvi. 1, 1891, pp. 115 *et seq.*



rather bleak. Some little distance away, however, there are several well-wooded areas.

The rocks of the neighbourhood are Carboniferous sandstones and shales. There is Carboniferous Limestone not more than 3 miles distant in a southerly direction.

## 2. SYSTEMATIC POSITION.

This species takes its place in the family Julidae, being referred to the genus *Cylindroiulus* (*Julus* s. l.) and subgenus *Leucoiulus*.

## 3. SOME EXTERNAL CHARACTERS.

### (a) Dimensions.

Dr. Verhoeff (*loc. cit.*) gives the following dimensions:—

Male: length 15–20 mm.; breadth 1·0–1·3 mm.

Female: length 18–24 mm., less often up to 29 mm., (as in the case of one example 2 mm. broad); breadth 1·3–2·0 mm.

The dimensions of three males taken at Winkhill in 1915 are:—

Length 14–20 mm.; breadth 1·0–1·3 mm.

And of three females taken at the same place in 1916:—

Length 22–24 mm.; breadth 1·6–1·8 mm.

### (b) Colour-markings etc.

The exoskeleton is brightly polished. Each pleurotergite of the trunk is composed, as usual, of a narrow anterior prozonite (fig. 2, *p*) and a broader posterior metazonite (fig. 2, *m*).

In our specimens the general tone of colour is brownish, but the shade varies very much in different specimens from quite dark to fairly light; above the level of the foramina the pleurotergites are relatively dark, and dorsally the segments are distinctly mottled by patches of a greyish tone; passing ventrally the somites get much lighter, and so the mottled appearance is practically absorbed by the general tone of colour. At the level of the foramina a row of distinct brown spots may be seen running along each side of the body. These spots occur on each of the metazonites except those of the first few and last few segments.

Frons and vertex without grooves.

The prozonites are smooth.

The metazonites are marked with longitudinal grooves set widely apart, but these grooves are wanting on the dorsal portions of the most anterior segments (fig. 1).

The ventral plates (sternites) are simple and insignificant.

Fig. 1.

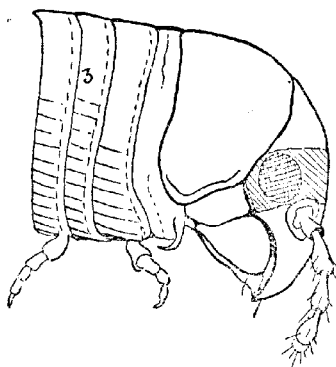


Fig. 2.

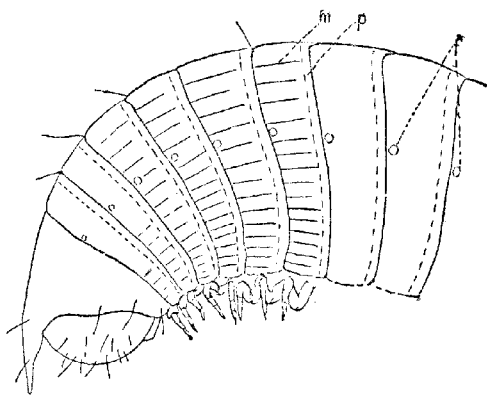


Fig. 1.—*C. nitidus*, anterior end of body of ♂. Details of eye not shown. On the collum segment the characteristic curved groove is clearly seen. 3 is the third body segment.  $\times 30$ . H. K. B. del.

Fig. 2.—Posterior end of same. *f*, foramina repugnatoria; *p*, prozonite; *m*, metazonite.  $\times 30$ . H. K. B. del.

Above the mouth four bristle-bearing dimples are present.

Crossing the head from side to side is a deeply pigmented band on which the eyes are situated laterally (fig. 1).

The collum segment is large and a longitudinal furrow runs along each of its lateral edges, which are slightly curved. Above this longitudinal furrow and parallel to it near the posterior border on each side two very much shorter grooves sometimes occur. These shorter furrows appear to correspond to the longitudinal grooves of other segments.

In *Julus nitidus* the foramina repugnatoria are small and situated on the posterior border of the metazonite, and so lie in close proximity to the sutures between the segments (fig. 2, f).

The tergite of the anal segment is produced into a long caudal horn which tapers gradually and is bluntly pointed at the tip; it is round in transverse section.

(c) Appendages.

We take the three males collected in 1915 as examples:—

A ♂ of 20 mm.	had 56 segments,	101 pairs of legs,	and 2 legless terminal segments.
A ♂ of 14 do.	46 do.	77 do.	4 do.
A ♂ of 14 do.	48 do.	85 do.	2 do.

The number of segments and, therefore, the number of pairs of legs vary considerably according to the maturity of the specimens.

The appendages of the males collected in 1915 are arranged as follows:—

Segments.	Pairs of limbs.	
1.....	1st	One pair, modified, hook-shaped.
2.....	2nd	One pair, with pads on the 4th and 5th joints and a secretory organ on the coxite.
3.....	...	Genital apertures.
4.....	3rd	One pair.
5.....	{ 4th {	Two pairs.
	{ 5th {	
6.....	{ 6th {	Two pairs.
	{ 7th {	
7.....	{ 8th {	Anterior gonopods.
	{ 9th {	Posterior gonopods.
8 and onward .	{ 10th, 11th, {	Two pairs.
	{ etc. {	
Last 2 or 4 ..	legless.	

In the female the first and second pairs of legs are not modified, and in place of the gonopods are two pairs of walking-legs; otherwise the arrangement is the same.

(d) *Ocelli*.

Dr. Verhoeff dwells upon the great interest of the ocelli in this species, and states that this character provides an intermediate condition between *Ommatoiulus* and *Allaiulus*. The external surface of the field of the eye is not broken up by the convexities of the individual ocelli, and with some illuminations the microscope reveals the fact that the field is quite smooth. With some illuminations it is impossible to see the individual ocelli, with others they are quite distinctly visible.

Ocelli arrangement (1915 material):—

In a ♂ of 14 mm.: 4, 5, 6, 5, 3, 2 (25). In curved rows, somewhat irregular.

In a ♂ of 20 mm.: 3, 5, 6, 6, 4, 4, 2, 1 (31). Irregular.

In a ♂ of 14 mm.: 3, 4, 6, 5, 4, 1 (23). Irregular.

In an immature specimen: 5, 4, 3, 2, 1 (15). Fairly regular.  
do. do. : 4, 3, 2, 1 (10). do.

It will be seen that there is great variation in the number of individual ocelli. This is also noticed in Dr. Verhoeff's description, where he records from 26–40 ocelli in different specimens. As in the case of the walking-legs, the greater number appear to occur in the more mature specimens.

Fig. 4.

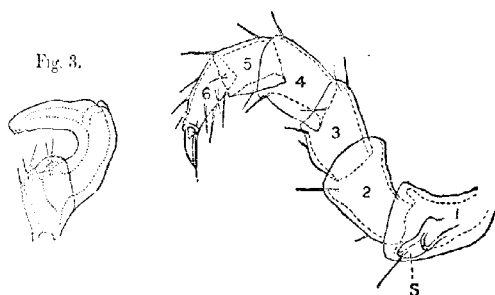


Fig. 3.—First leg of male of *C. nitidus*.  $\times 140$ . H. K. B. del.

Fig. 4.—Second leg of male, with segments numbered. s, secretory organ (penis).  $\times 140$ . H. K. B. del.

### 3. MODIFIED APPENDAGES OF THE MALE.

The first pair of legs are hook-shaped, forming an angle at the outer bend as the tip turns inwards, and a small prominence is present at this angle (fig. 3). The second pair

of legs are also slightly modified, the joints being thicker than those of the normal walking-legs, and pads are present on the fourth and fifth joints—that is, the penultimate and antepenultimate joints (fig. 4). The claws are strong, and the last joints are armed with strong bristle-like spines, some of which overlap the claws. The coxite bears a secretory organ (fig. 4, *s*). The copulatory feet or gonopods are composed of the modified appendages (two pairs) of the seventh body-segment. Their situation is denoted by a gap, as these legs are retracted, in this group, within the somite to

Fig. 5.

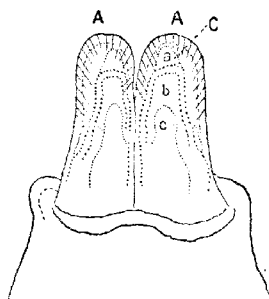
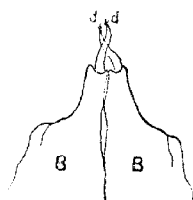


Fig. 6.



Figs. 5-8.—Gonopods. A, anterior gonopod; B, posterior portion of posterior gonopod; C, anterior branch of posterior gonopod; *a*, *b*, *c*, parts of C; E, flagellum; *d*, hooked part of B; L, L, point of measurement (see text).

Fig. 5.—Silhouette of anterior gonopods, anterior surface.  $\times 140$ .  
H. K. B. del.

Fig. 6.—Silhouette of posterior gonopods, posterior surface.  $\times 140$ .  
H. K. B. del.

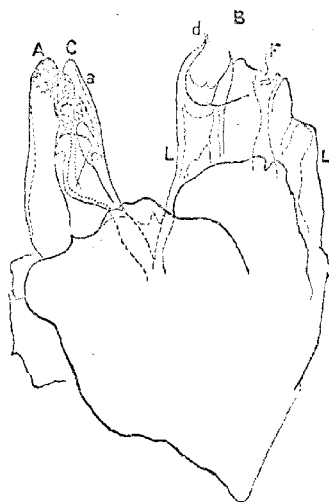
which they belong. They are complicated in character, and the anterior and posterior gonopods of each side are firmly attached to one another. The anterior pair of gonopods are seen from an anterior position as two lobe-like projections rounded at the tip (fig. 5). From a posterior position the posterior pair appear as two pointed projections with the tips turned inwards, broader at the base than at the tips (fig. 6). Viewed from the side the external surfaces of the anterior and posterior gonopods are seen (fig. 7). They are clearly separated at the free ends and united at the bases. The anterior gonopods are stronger and generally less transparent than the posterior pair, which is delicate and very transparent, some parts being irregular in outline.

The *anterior gonopods* are leaf-like in form, and, being convex posteriorly, their lateral edges wrap round and protect the anterior branch of the posterior gonopods somewhat (fig. 7).

The *posterior gonopods* consist of a foliaceous anterior branch and a subtrapezoidal posterior portion.

The anterior branch consists of three parts—*a*, *b*, and *c*—which are very distinct and characteristic; *a* is finger-shaped and is the longest, standing out well beyond the others; the middle portion, *b*, is the strongest, and is protected by very

Fig. 7.



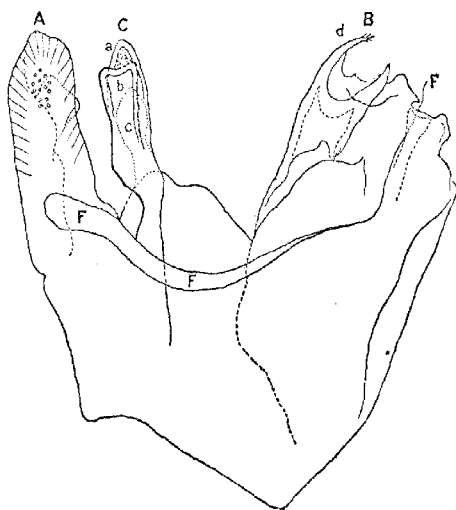
Anterior and posterior gonopods, external profile.  $\times 140$ . H. K. B. del.

thick chitin; while *c* is smaller and approaches in shape more nearly to *a*.

The structure of the posterior gonopod is clearly seen in fig. 8, which represents the inner view of the gonopods both anterior and posterior of one side. In this case the appendages have been flattened out somewhat to show the separate parts of each. The most prominent part of the posterior portion of the posterior gonopod is the hooked piece, *d*, which is sparsely pubescent at the tip, while a noticeable feature is the flagellum, *F*. This, which is inserted upon the base of the anterior

gonopod, curves round so that its tip appears in repose above the delicate part of the posterior gonopod behind the hooked portion *d*. The actual breadth of the posterior gonopods at L-L in the specimen figured is 0.210 mm.\* and that of the whole organ (anterior and posterior gonopods of one side together) is .4 mm.

Fig. 8.



Anterior and posterior gonopods, internal profile.  $\times 140$ . H. K. B. del.

We are deeply indebted to Monsieur le Docteur Henry W. Brölemann for his very careful examination and report upon our material. Drawings of the gonopods which he furnished have been invaluable in the preparation of the illustrations which accompany this paper.

We must also express our best thanks to Miss Simpson, of Darwin, for her assistance in translation.

The Victoria University of Manchester.

\* Dr. Brölemann's measurement.

